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Understanding the Holy Grail of Strategic Management: The Micro-foundations and Performance Conditions of Dynamic Capabilities

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Two little mice fell in a bucket of cream. The first mouse quickly gave up and drowned. The second mouse wouldn't quit. He struggles so hard that eventually he churned that cream into butter and crawled out. Gentleman, as of this moment, I am that second mouse.

(Christopher Walken in Catch me if you can (2002))

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6:00 am Boston time… all is still quiet at the 12th floor of the Westin Hotel in this beautiful city near the Charles River. During these quiet moments far away from home, I spontaneously look back on my journey as a Ph.D. student remembering all the wonderful moments, the cities I've visited, the fantastic work atmosphere, all the interesting people I've met but also the moments I was still working late at night and the times I went home telling myself not to give up. Completing a Ph.D. is indeed a fantastic learning experience that goes beyond the academia but also a very demanding and challenging process. This doctoral thesis would not have been possible, however, without the encouragement, support, feedback and insights of many people.

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Robin De Cock – November 2012

Summary

Researchers, policy makers, investors and managers have long tried to understand why some firms survive and even prosper in the face of environmental changes, while others wither. To build a competitive advantage and to cope with environmental changes, firms need to renew themselves. Inability to do so may have severe consequences for firms, the people they employ, and the communities in which they operate (Danneels, 2010). Especially, in the early stages, new ventures are confronted with environmental changes, resource constraints and cognitive limitations which almost always prevent founders from executing their plans as initially intended (Baker, Miner, & Eesley, 2003; Hmieleski & Corbett, 2008). Consequently, new ventures will need to build dynamic capabilities which can be defined as the capacity to sense and seize opportunities and change the firm's resource base, its substantive capabilities or its environment (Teece, 2007; Helfat and Winter, 2011).

Despite the development of the concept, the numerous publications in leading top journals and the argued importance of capabilities to competitive advantage and firm performance, many theoretical and empirical issues remain a source of debate (Hoopes, Madsen, and Walker, 2003; Armstrong and Shimizu, 2007; Newbert, 2007, 2008). After more than two decades of mainly theoretical research, elaborating on the question how established firms can create a competitive sustainable advantage, I conduct three empirical studies and apply the dynamic capability perspective to the context of new technology-based ventures. We can divide the extant dynamic capability literature into two research streams (Zahra et al., 2006).

A first stream of research in dynamic capability literature focuses on the capability formation. To trace the emergence of capability formation, one needs to track the early stages of a firm, because it is during this phase that capabilities are developed. A central argument of capabilities-based work is that routines or capabilities are the fundamental units of analysis, and that the organization should be conceptualized as

the central repository of routines and capabilities (e.g., Nelson and Winter 1982). However, despite over two decades of largely theoretical (and some empirical) work, as well as recent efforts to clarify the meanings of organizational routines and capabilities (Winter, 2003), fundamental questions about their origins and micro-foundations still persist. In this thesis, I argue that many of the problems associated with capabilities-based work are a result of the focus on collective level constructs (e.g. routines) at the expense of individual-level considerations.

In paper 1 of this dissertation, I investigate the capability development process from a micro-foundation perspective and analyze how a dynamic capability is developed over time in a case study of a new venture which was initially one of the highest successes but eventually failed to address a significant change in the environment. In line with recent studies, we argue that hierarchies matter in explaining dynamic capabilities and consider different decision makers at different layers in the process of developing dynamic capabilities. Paper 2 focusses on the role of the founders and the entrepreneurial team to bundle resources in either substantive or dynamic capabilities. Here, we use the upper echelon and the micro-foundation perspective, to investigate which early top managers' (founders) characteristics will influence either the development of substantive or dynamic capabilities. Substantive capabilities represents the firm capacity to perform a particular activity in a reliable and at least minimally satisfactory way (Helfat and Winter, 2011:1244) while dynamic capabilities can be defined as the capacity to change the firm's resource base, its substantive capabilities or its environment (Teece, 2007; Helfat et al., 2007; Helfat and Winter, 2011).

A second stream of research analyses the impact of dynamic capabilities on firm performance. Early proposals in this field clearly assumed a direct relationship between firms' dynamic capabilities and their performance (Teece et al., 1997). These authors stated that this framework is intended to explain firm-level success and failure, competitive advantage, and private wealth creation (Teece et al., 1997; Makadok, 2001; Zollo and Winter, 2002). More recently, Teece (2007) stated that "

the ambition of the dynamic capabilities framework is nothing less than to explain the sources of enterprise-level competitive advantage over time" and that "dynamic capabilities lies at the core of enterprise success (and failure)." However, other researchers took a more cautious approach towards the relation between dynamic capabilities and performance. In their view, long-term competitive advantage does not only rely on dynamic capabilities themselves but on the resource configurations or substantive capabilities created by the dynamic capabilities (Zahra et al., 2006) and on "using dynamic capabilities sooner, more astutely, more fortuitously than the competition" (Eisenhardt & Martin 2000). Very recently, researchers build further on this logic and clarified the conditions under which dynamic capabilities can be valuable (Drnevich and Kriauciunas, 2012). Helfat and Winter (2011) and Drnevich and Kriauciunas (2012) showed that although dynamic capabilities might be more useful in dynamic environments, they also lead to competitive advantage in less dynamic ones. Beyond the environment, the literature remains silent when it comes to boundary conditions at company level. Paper 3 analyses the boundary conditions under which dynamic capabilities can be beneficial in the challenging early stages of a new venture.

To examine the research questions of the first paper, I used an inductive case study design, collecting data through participant observation over a two year period, content analysis of email conversation and analysis of board documents, meeting minutes and different versions of the business plan. The case study was not only useful to answers the research questions of paper 1, it also appeared very valuable as a basis for the development of a measurement instrument for substantive and dynamic capabilities which we used in paper 2 (appendix B and C) and 3 (appendix D). In the second paper, we obtain a mixed methodology and combine two years of exploratory qualitative research with a quantitative research design based upon a survey of 144 founders of 78 new technology-based ventures followed in a period of three years. Finally, in paper 3 we obtain a quantitative research design to test the relationship between dynamic capabilities and firm survival. Therefore, we started from the same database of new technology based firms and added more recently

founded new technology based firms. In the end, we managed to collect data from 230 founders of 124 new technology-based firms.

In paper 1, I focused on the micro-foundations of capability development and used a micro perspective to investigate the development process of dynamic capabilities. Using the phases of *perception, willingness* and *ability* which typically are considered the building blocks of dynamic capabilities, we found several important barriers to the development of dynamic capabilities. First, we show that a firm should be able to manage attention which is distributed across different levels of the hierarchy as part of the awareness creation process. Understanding the management of distributed attention is key to advancing the theory of dynamic capabilities and more specifically to improve the "awareness/perception" part. Secondly, firms should manage different levels of cognitive dissonance to create willingness. Although different layers in the organization were recognizing the change in the environment and were willing to develop an answer to address the environmental need, this did not mean that they were willing to change the business model at company level nor to change the associated resources. Finally, implementing change means that not only awareness and willingness is created, the individual decision makers must also be able to do so. We show in our case study that instead of moving from one configuration to another, the new business model and resource configuration is added upon the existing one. Only after that the second resource configuration has proven to be successful, we can assume that the first one loses in importance and will be gradually divested. As such, the organization will need to cope with competing objectives as a way to finalize the implementation of dynamic capabilities. On the one hand they need to create evidence for the new business model, while on the other hand they need to match the milestones of the old one. We suggest that these competing objectives can be managed by viewing flexibility and efficiency as a duality both at individual and systems level. This implies that a context is created to stimulate individual ambidexterity, that redundancy and cognitive variation are built into the system and that management practices such as flexibility inducing mechanisms are adopted to implement the change effectively.

Building on the upper echelons theory, which state that the firm reflects the preferences of its top management team (Hambrick and Mason, 1984), I found in the second study of my Ph.D that micro-foundations, measured as personality traits, also explain why ventures either develop substantive or dynamic capabilities. First, I show that conscientious founders and their teams foster the development of substantive capabilities. Conscientious founders are typically described as hard working, achievement oriented, forward planning and well structured (Gellatly, 1996; Bell, 2007; Ciaverella et al., 2004; Barrick and Mount, 1991). This personality type impacts the way in which the venture is structured and predicts the extent to which the founder emphasizes the development of procedures to increase the venture's efficiency. However, to sense or shape new opportunities and to change existing substantive capabilities, new ventures need to develop dynamic capabilities. Our findings indicate that conscientious founders lack interest in developing these capabilities. Instead, I found that conscientious individuals need proactive team members to develop dynamic capabilities. Hence, if conscientious founders team up with proactive co-founders, their ventures do develop dynamic capabilities. Our results also show that proactive personalities have a strong positive impact on the development of dynamic capabilities, while they ignore the development of substantive capabilities. We further find that firms with proactive entrepreneurs without conscientious co-founders tend not to develop substantive capabilities. This means that proactive individuals will also benefit from working with conscientious co-founders.

In the third paper, we clarify the conditions under which dynamic capabilities play an important role in the early stages of a new venture. This study theoretically extends the literature on dynamic capabilities towards organization theory where scholars tend to focus on stability as an important element of organizational performance. First, we show that formalization improves the impact of dynamic capabilities on the performance of new ventures. More specifically, we show that dynamic capabilities benefit from clear internal role specialization and formalization of the founding team. Second, we show that redundancy on the work

floor has a similar impact on the relation between dynamic capabilities and performance. Third, we show that boards, which are considered a third source of stability, do not have the same impact on the relation between dynamic capabilities and new venture performance. On the contrary, boards limit the impact of dynamic capabilities. Boards typically monitor the new venture performance based upon an agreed business plan which is difficult to change. External directors in boards might be too distant from the new venture's operations to be assistive in implementing changes.

This dissertation makes several contributions to the strategic management literature, more specifically to the literature on dynamic capabilities, but also to the entrepreneurship literature, upper echelon theory and research on personality and cognition. This Ph.D defines dynamic capabilities in a new venture context, provides insights in how dynamic capabilities are formed and explains under which conditions dynamic capabilities can be beneficial for new venture survival. It addresses different gaps in the dynamic capabilities literature by taking a process and micro-foundation perspective on capability formation and by defining the boundary conditions under which dynamic capabilities can be beneficial for firm survival. Finally, this research offers several practical implications for entrepreneurs, (public) investors and policy makers. Entrepreneurs can find useful insights in this study regarding the development of dynamic capabilities and team composition in the early stages of a new venture's life. This study can also help policy makers in developing support programs for new technology-based firms and for new ventures in nascent markets. These start-ups circulate new knowledge in our economy and can be considered as important drivers in transforming our economy and replacing sectors that are fading away because of economic crises and other environmental shocks.

List of publications and conference presentations based on this doctoral research

Articles

De Cock, R. and Clarysse, B., Understanding the Development of Substantive and Dynamic Capabilities in New Ventures: The Role of Founder's Personality, Under review at Strategic Management Journal.

Book chapters

De Cock, R. (2009), Groei door acquisities bij hightech starters in Clarysse B., 2009, Groeizaam Vlaanderen - Een beleidsondersteunend wetenschappelijk perspectief, Steunpunt Ondernemerschap, Ondernemingen en Innovatie - Roularta books, Roeselare.

Working papers

De Cock, R., and Clarysse, B. (2012) Understanding the Micro-Orchestration of Resources as a Process leading to Dynamic Capabilities.

De Cock, R., and Clarysse, B. (2012) The Contribution of Dynamic Capabilities to New Venture Survival in Nascent Markets: The Boundary Role of Formal Structures.

Conference presentations

De Cock, R. and Clarysse, B. (2011), Understanding the Development of Substantive and Dynamic Capabilities in New Ventures: The Role of Founder's Personality and Experience, Babson College Entrepreneurship Research Conference 2011 (Syracuse, NY, USA).

De Cock, R. and Clarysse, B., (2011), Understanding the Development of Substantive and Dynamic Capabilities in New Ventures: The Role of Founder's Personality and Experience, Academy of Management Annual Conference, 2011 (San Antonio, Texas, USA).

De Cock, R. and Clarysse, B., (2012), Understanding the Development of Substantive and Dynamic Capabilities in New Ventures: The Role of Founder's Personality, Academy of Management Annual Conference (Boston, Massachusetts, USA).

De Cock, R. and Clarysse, B. (2012) Understanding the Micro-Orchestration of Resources as a Process leading to Dynamic Capabilities, Strategic Management Society Conference, 2012 (Prague, Czech Republic).

De Cock, R. and Clarysse, B. (2012) The Contribution of Dynamic Capabilities to New Venture Survival in Nascent Markets, Strategic Management Society Conference, 2012 (Guangzhou, China).

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1 Introduction

In fast-paced, globally competitive environments, consumer needs, technological opportunities, and competitor activity are constantly in a state of flux. Opportunities open up for both newcomers and incumbents, putting the profit streams of enterprises at risk (Teece, 2007). This situation implies that firms should be managed in such a way that they can build successive temporary competitive advantages by effectively responding to successive environmental shocks (D'Aveni, 1994; Eisenhardt & Martin, 2000) and/or by creating environmental change (Teece, 2007). Organizations need to continuously renew themselves if they are to survive and prosper in dynamic environments. This renewal challenge is even more pronounced in the current business environment characterized by fast changes in customers, technologies, and competition (Danneels, 2002). How can firms successfully address such a challenging task? The "dynamic capabilities" approach provides one important response to this crucial question and has become dominant in explaining how companies can create a competitive advantage.

1.1 Dynamic capabilities: origins, definition and current state of the literature

The dynamic capabilities concept is rooted in the resource based theory which intends to explain the conditions under which firms may achieve a competitive advantage based on their bundles of resources and capabilities (Barney, 1991; Barney et al., 2011). Capabilities refer to a firm's capacity to purposefully deploy a combination of resources and processes to achieve a desired goal (Amit & Schoemaker, 1993; Autio et al. 2011). However, in the current business environment characterized by fast changes in customers, technologies, and competition, organizational capabilities can become quickly ineffective. The seminal article of Teece (1997) extended the resource based theory to a more dynamic context (Teece et al., 1997) and considered dynamic capabilities, which can be defined as the capacity to change a firm's resource configuration, as the source of

sustained competitive advantage (Teece et al., 2007). Whereas Teece et al. (1997) refer to dynamic environments as a primary reason for dynamic capabilities to emerge, Eisenhardt and Martin (2000) show that dynamic capabilities also have advantages in moderately dynamic environments, and Helfat and Winter (2011) even provide anecdotal evidence that dynamic capabilities can lead to competitive advantage even in relatively stable environments. Dynamic capabilities has been recognized, not only to withstand the 'gales of creative destruction,' but also to create them (Danneels, 2002).

Since Teece et al.'s (1997) landmark article, the dynamic capabilities view has generated an impressive flow of research. According to the ABI/INFORM database, at least 1,534 articles used the dynamic capabilities concept from 1997 to 2007, encompassing not only its original field, strategic management, but also most of the main areas in business administration (Barreto, 2010). From 1997 to 2012, I found a total of 51 articles published in leading management journals (Academy of Management Journal, Academy of Management Review, Administrative Science Quarterly, Journal of Management, Journal of Management Studies, Management Science, Organization Science, and Strategic Management Journal) that have mentioned "dynamic capabilities" in their title and/or their abstract.

However, despite the development of the concept and the argued importance of capabilities to competitive advantage and firm performance in past research, many theoretical and empirical issues remain a source of debate (Armstrong and Shimizu, 2007; Newbert, 2007). After more than two decades of mainly theoretical research, elaborating on the question how established firms can create a sustainable competitive advantage, I conduct three empirical studies and apply the dynamic capability perspective to the context of new technology-based ventures. The emergent literature on capabilities in new ventures argues that new ventures are not simply new and small versions of established firms for several reasons (Zahra et al., 2006; Autio et al., 2011). First, new ventures often have no layers of middle managers to separate top management from operations, whereas established firms exist out of multiple bureaucratic layers (Mintzberg, 1978; Sine et al., 2006). Second,

new ventures are often operating in uncertain and fast moving environments which means that these ventures are rapidly changing and that strategic objectives are still in flux (Zahra et al., 2006). Third, new ventures seldom start with well-formed capabilities, which emphasizes the creation of de novo capabilities over the modification of existing ones (Autio et al., 2011). As these main differences between new and established ventures seem to insinuate, the years of capability research in strategic management literature cannot be simply copied to the context of new ventures. As such, they should be studied separately based on organizational type (Zahra et al., 2006).

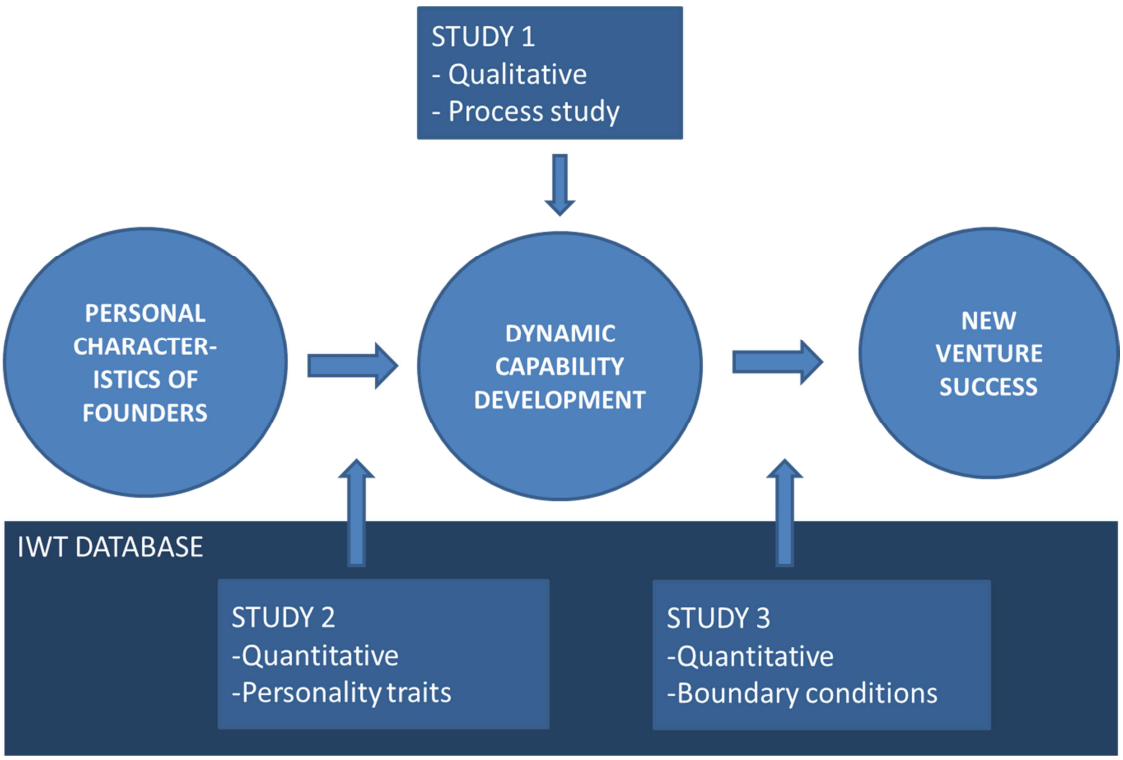
We can divide the extant dynamic capability literature into two research streams (Zahra et al., 2006). A first stream of research focuses on the impact of capabilities on firm performance. Early proposals in this field clearly assumed a direct relationship between firms' dynamic capabilities and their performance (Teece et al., 1997). These authors stated that this framework is intended to explain firm-level success and failure, competitive advantage, and private wealth creation (Teece et al., 1997; Makadok, 2001; Zollo and Winter, 2002). More recently, Teece (2007) stated that "the ambition of the dynamic capabilities framework is nothing less than to explain the sources of enterprise-level competitive advantage over time" and that " dynamic capabilities lies at the core of enterprise success (and failure)." However, other researchers took a more cautious approach towards the relation between performance and dynamic capabilities. In their view, long-term competitive advantage does not only rely on dynamic capabilities themselves but on the resource configurations or substantive capabilities created by the dynamic capabilities (Zahra et al., 2006) and on "using dynamic capabilities sooner, more astutely, more fortuitously than the competition" (Eisenhardt & Martin 2000). Very recently, researchers build further on this logic and clarified the conditions under which dynamic capabilities can be valuable (Drnevich and Kriauciunas, 2012). However, the impact of dynamic capabilities on the performance of new ventures and the conditions under which dynamic capabilities can be beneficial in these early stages remains a black box (Zahra et al., 2006).

A second stream of research in dynamic capability literature focuses on the capability formation. To trace the emergence of capability formation, one needs to track the early stages of a firm, because it is during this phase that capabilities are developed. As Autio et al. (2011) highlighted, in a firm's early stages no routines have been accumulated over time, and more focus is needed on de novo capability development. In order to analyze which capabilities managers are likely to develop from scratch in firms, Teece (2007) already highlighted that the micro-foundation view on capabilities is an interesting avenue for research because most research on capability development is on a firm level. The micro-foundations include the distinct individual characteristics which influence the decision making behavior of managers (Felin and Foss, 2005). Moreover, the dynamic capabilities literature has mainly adopted a routine-centered view, while overlooking the roles which managers play in developing these resource configurations and initiating the processes that lead to capabilities (Sirmon, Hitt, Ireland and Gilbert, 2011).

1.2 Research questions

Despite the numerous publications on dynamic capabilities in top management journals, empirical work on dynamic capabilities is still in its infancy (Newbert, 2007). The aim of this Ph.D is to address empirically some crucial remaining gaps in the capability literature. Paper 1 and 2 concentrate on the micro-foundations and micro-processes of capabilities and explores the role of individual decision makers in developing capabilities. Paper 3 looks at the capability – performance relation and investigates the boundary conditions under which dynamic capabilities can be beneficial for new ventures (see Figure1).

FIGURE 1: Ph.D framework



A process view on the development of dynamic capabilities. In the first study, I investigate the development process of dynamic capabilities. The dynamic capability literature in general has been criticized as lacking fundamental theoretic logics which explain the origins of dynamic capabilities and the micro-processes behind the development of dynamic capabilities. In line with this a few studies have argued that hierarchies matter in explaining dynamic capabilities. Building on these studies, we analyze how a dynamic capability is developed over time in a new venture which was initially one of the highest successes but eventually failed to address a significant change in the environment. We used an inductive case study design, collecting data through participant observation over a two year period, content analysis of email conversation and analysis of board documents, meeting minutes and different versions of the business plan. Using the phases of perception, willingness and ability which typically are considered the building blocks of dynamic capabilities, we made sense of this richness of data.

The influence of founder personality on the development of substantive and dynamic capabilities. Consistent with the upper echelons literature and using a micro-foundation approach, the second study provides compelling evidence that personal characteristics of the early top managers (firm founders) predict capability development. The literature agrees that substantive capabilities and dynamic capabilities are crucial for firm performance. Substantive capabilities represents the firm capacity to perform a particular activity in a reliable and at least minimally satisfactory way (Helfat and Winter, 2011:1244) while dynamic capabilities can be defined as the capacity to change the firm's resource base, its substantive capabilities or its environment (Teece, 2007; Helfat and Winter, 2011). Using a methodology combining two years of exploratory qualitative research and a survey of 144 founders, we argue that founder personality predict the development of either substantive or dynamic capabilities. Our study is also one of the first to develop scales to measure substantive and dynamic capabilities.

Dynamic capabilities and new venture success: the boundary conditions As substantive capabilities have an important impact on firm performance, dynamic capabilities can under certain circumstances also contribute to firm performance by changing these existing substantive capabilities in the direction of new opportunities (Drnevich and Kriauciunas, 2012). However, less is known about the boundary conditions under which dynamic capabilities can indeed have an impact on the firm performance. Especially in nascent markets, dynamic capabilities will be the key capabilities that are needed to survive the difficult early stages of new ventures. However, the impact of these capabilities on firm survival and the conditions under which dynamic capabilities can be beneficial remains largely unknown. While dynamic capabilities can be viewed as important mechanisms to guide new ventures through the difficult early stages, Farjoun (2010) does alert that in order to survive, organizations must reconcile stability with change. In the third paper, we investigate the moderating effects of formal structure and firm stability on the relationship between dynamic capabilities and new venture survival.

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2 Understanding the Micro-Foundations of Dynamic Capabilities: Managing Attention, Cognitive Dissonance and Competing Objectives at Different Hierarchical Levels

ABSTRACT

The dynamic capability view remains silent when it comes to the origins of and the micro-processes behind the development of these capabilities. We analyze how dynamic capabilities are developed over time in a new venture which was confronted with a significant change in its environment. We used an inductive case-study design, collecting data through participant observation over a four-year period. We complemented this data with content analysis of email correspondence and analysis of board documents, meeting minutes and different versions of the business plan. We show that the building blocks of dynamic capabilities exist of the (a) company's capacity to manage attention across different levels of the hierarchy to create perception of the changes in the environment through a process of issue selling, (b) the level to which it succeeds to overcome different levels of cognitive dissonance among its individual decisions makers to create willingness through collective sense making and (c) the company's capacity to manage competing objectives to enable the change implementation process by integrating efficiency and flexibility as a duality. We thus extend the dynamic capability perspective by describing the micro-processes behind it and embedding them within the attention-based view, cognitive dissonance theory and the literature on competing objectives.

KEY WORDS: dynamic capabilities; attention; cognition; competing objectives; micro-foundations

2.1 Introduction

For more than a decade, dynamic capabilities have attracted considerable attention within the strategic management literature to explain how firms can create a competitive advantage in dynamic, moderately dynamic and even static environments (Eisenhardt and Martin, 2000; Helfat and Peteraf, 2003, Zahra, Sapienza, and Davidsson, 2006; Teece, 2007; Barreto, 2010; Helfat and Winter, 2011). Dynamic capabilities give a firm the ability to change its resource configuration, with respect to both tangible and intangible resources (Zollo and Winter, 2002; Teece, 2007; Helfat and Winter, 2011). Initially the extant literature considered dynamic capabilities to be routines that develop over time (Eisenhardt and Martin, 2000; Zollo and Winter, 2002). However, more recently scholars have defined dynamic capabilities as a managerial process (Teece, Pisano and Schuen, 1997; Zahra et al., 2006; Teece, 2007) which enables a firm to become aware of or sense opportunities/threats, seize or act upon these opportunities/threats and restructure the firm's resource configuration. While the management view on dynamic capabilities helps in explaining *what* the different stages of dynamic capability development are in a managerial process, it remains silent on the question of *how* these dynamic capabilities are developed. In line with this observation, Danneels (2010) calls for a process view to open the black box of dynamic capability theory, allowing us to examine the origins and the paths of dynamic capability development. This is exactly the research gap we aim to address in this paper.

To provide more theoretically grounded insights into the development of these dynamic capabilities, we use the extended case method (Burawoy, 1991; Tripsas and Gavetti, 2000; Danneels, 2010). We start with the existing literature on the micro-foundations of dynamic capabilities, which alludes to the role of cognition and the way in which cognition might differ across the hierarchy of decision makers. Managerial cognition is relevant in the early stages of capability formation (Helfat and Peteraf, 2003; Adner and Helfat, 2003; Autio, George and Alexi, 2011) and plays

a role across the hierarchical levels of the firm (Gavetti, 2005; Danneels, 2010). The rich literature on managerial cognition emphasizes the role of cognitive processes and sense making of perceived environmental opportunities/threats as a key regulator of actions which lead to capability development (Barr, Stimpert and Huff, 1992). However, whereas managerial cognition has usually been studied as a guide for change processes induced by top management teams (e.g. Tripsas and Gavetti, 2000), Gavetti (2005) introduces the concept of situational attention in the capability literature. He argues that the higher the decision maker is situated in the hierarchy the more distant he/she is from the firm's actions, and thus the more difficult it is for him/her to interpret organizational experiences which create biases in the actions taken. Danneels (2010) further extends this view by showing that resource cognition, i.e. the identification of key resources in a firm and the understanding of their fungibility, differs across the various hierarchical levels of a company. Building on these insights, we analyze the managerial process of dynamic capability development across the different hierarchical layers in a company to address our research question on *how* dynamic capabilities are developed in firm.

We use the empirical context of a new, venture capital (VC)-backed firm in the mobile internet industry (We❤Mobile) and follow the company from its inception in February 2006 to its liquidation in December 2010. The relevant period of observation to study the genesis of dynamic capabilities and their formation over time starts with the underwriting of a specific business plan and the term sheet agreement between the founders and the A-round investors in November 2008. From then on more routines and procedures are developed to increase the company's efficiency and effectiveness in pursuing the milestones associated with the business model which all stakeholders did agree upon. Hence, dynamic capabilities needed to be developed to make changes to the business model. The importance of developing dynamic capabilities to change the original business model has been documented in business books describing the success of young ventures. For instance, Symantec started as an artificial intelligence company before changing into a linguistics platform and later into the anti-virus software firm,

which we all know today (Dorf and Byers, 2008), while Google began as a library reference search tool before changing its business model into an OEM internet search product and eventually developing AdSense as a new revenue tool (Vise and Malseed, 2006). The choice of a venture rather than an established company is based upon the fact that this venture has no established routines yet, so it is easy to disentangle managerial processes from learning-based outcomes. The entrepreneurial start-up phase of the company was extremely successful and attracted the attention of venture capitalists, resulting in an A-round of venture capital of 4 Million Euros for which the term sheet was signed in November 2008. From then on, the firm's resource configuration was shaped around a high-end, powerful technological solution to transform websites into mobile sites. Critical to this configuration was the development of a key account management model to approach customers. Shortly after the venture capital investment, the launch of the App Store by Apple changed the environment radically, and forced the company to focus on a different customer segment by offering a user-centric web development tool. The introduction of the App Store is the kind of environmental jolt that typically places firms in jeopardy because it is difficult to foresee and its impact on other firms is disruptive and inimical (Meyer, 1982). In our case study, We❤Mobile failed to change its resources and associated business model accordingly in response to this jolt. The initial success and ultimate failure of the company make it an excellent study object: as Williamson (1999: 1093) stated "more informative, often, than success stories are stories about failure—especially the failures of once successful enterprises to adapt to new circumstances" (see also Priem and Butler, 2001; Danneels, 2010).

We put forward three main findings. First, dynamic capabilities will only be developed at firm level if at each hierarchical level in the organization the need for change is "perceived" as an opportunity. Since not every decision maker in the organization has the same focus of attention, this opportunity perception process needs to be managed. This can be realized by managing the attention of the different decision makers using elements of issue selling such as "objectivation of data",

"direct modes of communication" and "communication persistence". Second, individual cognitive dissonances at each of these levels create rigidities which limits the willingness of individual decision makers to change. Decision makers will tend to minimize the needed changes, look for solutions they are familiar with or simply ignore the need for change. Elements from the literature on prospective collective sense making can be used to overcome these barriers. Material artifacts can be used to stimulate collective sense making together with more general KPIs and the use of reference cases or best practices. Third, to implement changes, the organization will need to cope with competing objectives as a way to finalize the implementation of dynamic capabilities. On the one hand they need to create evidence for the new business model, while on the other hand they need to match the milestones of the old one. We suggest that these competing objectives can be managed by viewing flexibility and efficiency as a duality both at individual and system level. This implies that a context is created to stimulate individual ambidexterity, that redundancy and cognitive variation are built into the system and that management practices such as flexibility inducing mechanisms are adopted to implement the change effectively. This paper extends the literature on dynamic capabilities by introducing three theoretical perspectives and explains what the barriers are to introduce dynamic capabilities as a management process and what the solutions might be to overcome these barriers.

The remainder of the paper is organized as follows. First, we outline our methodological approach which includes the data collection and data analysis procedures. We then describe how We❤Mobile tried to change from one resource configuration and associated business model to another one, focusing on how, at different levels of the organization—namely the operational, the management, the board and the investment committee level—the new environment was sensed, the willingness to change was created and decisions were made or not made to implement the new configuration and business model. Third, we present the findings of our study. Finally, we conclude with a discussion of our key findings.

2.2 Method

This research is based on an in-depth, longitudinal case study of a new venture in the emerging mobile internet industry. Given the lack of theory on *how* dynamic capabilities are developed in a company (Sirmon, Hitt, Ireland and Gilbert, 2011), we argue that this approach is most useful (Eisenhardt and Graebner, 2007). In addition, by taking a longitudinal process perspective we gain insight into which decisions have to be made at different hierarchical levels and which actions need to be taken to bridge cognitive gaps and evolve from one resource configuration and associated business model to another one. Finally, our case study design allows us to use a combination of different data sources, including (1) participant observation, (2) company archives and (3) publicly available data (Yin, 1994). We take care of potential problems of construct validity by using multiple sources of evidence or multiple measures of the same facts (Yin, 1994). We❤Mobile is a particularly attractive case study because the company was extremely successful in its first two years after founding and succeeded in one of the largest A-round VC deals in Belgium, but then subsequently had to change its resource configuration as a response to environmental conditions, which had abruptly changed. It eventually failed because one of its investors did not support the new business model. The success and subsequent failure of the case did make it an unusually rich source of data (Priem and Butler, 2001). The richness of the data allowed us to map We❤Mobile's change process in detail and gain insights into the relationships between key decision makers, which are necessary to investigate the micro-foundations of the resource-structuring process in the start-up phase of a company's life (Sirmon et al., 2011). Triangulation of various types of data, collected through different methods, can overcome the limitations of a single method by counter-balancing the weaknesses of one method with the strengths of another (Jick, 1979).

2.2.1 Data sources

An important data collection method was participant observation. One of the authors (principle investigator) of this study was able to attend the weekly management meetings of this venture, monthly board of directors (BOD) and biweekly communication forums to the employees. We employed an insider-outsider approach, which means that two outside authors were involved in the actual analysis so that the credibility of the findings would not rely solely on the interpretations of a single analyst (Gioia, Price, Hamilton and Thomas, 2010). Instead of analyzing key people's responses in interviews, the participant observation method captures managers in their corporeal reality, time, and space (Burawoy, 1991). The actual time of participant observation ranged from February 2006 (start-up) to June 2010 (liquidation), time spent averaged about 1 day per week. The time frame covered in this paper ranges from November 2008 (term sheet closure) to June 2010 (liquidation). We attended the weekly management meeting led by the CEO and participated in different informal events with the employees of We❤Mobile. In January 2009, We❤Mobile recruited a COO who decided to introduce a biweekly communication forum to the employees which we also attended. Finally, after finishing a successful venture capital series A round in March 2009, a formal board of directors was installed and we participated in the monthly board meeting. Altogether, we attended 108 meetings which accounted for approximately 275 hours of observation. Regular written field notes provided a key resource to articulate the story and understand the linkages between facts during the period studied. The observation activities during the company's meetings were crucial to provide us with a clear insight into what was perceived as relevant by the team, and gave us a better understanding of the relationships between the key decision makers.

The company archives include extensive documentation covering nearly every important document circulated during the company's existence. First, we had access to the official reports of every board and management meeting. Secondly, we could review all the documents stored on the intranet server (dropbox) of the company.

The “dropbox” was used by the management team, business developers, software engineers and other employees to “drop” important documents so that everyone can see or use these documents. Finally, the largest and most unique source of information is the e-mail account of one of the founders which enabled us to follow the complete e-mail communication between the sales and marketing director, CEO, COO, account managers, the chairman of the board, investors, key software engineers, (potential) clients and partners. Not only was the content of the e-mails taken into account, e-mail attachments were also analyzed. These attachments included different versions of the business plan, shareholder negotiations, marketing, product and technology roadmaps, and staffing plans. Finally, we collected publicly available data such as business press articles, press releases, elevator pitches and presentations at mobile internet conferences. This gave us a better view of how the firm presented itself towards important actors in its environment. An overview of the documentation in this case study is provided in table 1.

2.2.2 Data analysis

We used the extended case method to analyze empirical data gathered through the case in order to extend the existing dynamic capability theory (Burawoy, 1991; Danneels, 2002). Since the dynamic capability perspective already offers a rich variety of insights, and there have already been a number of scholars who have emphasized the importance of cognitions and hierarchy to understand the micro-foundations of dynamic capabilities (Barney et al., 2011), we did not want to start from scratch and develop a new theory but preferred instead to use the extended case method to stretch and consolidate the existing work on dynamic capabilities.

TABLE 1: Data Inventory

Data Type	Quantity	Original data source	Original (intended) data audience
E-mails	4.266 emails, approximately 5.500 pages	Founder's e-mail account	Emails to employees, top management team, partners, board members, (potential) investors,…
E-mail attachments	1.992 email attachments, approximately 12.000 pages	Founder's e-mail account	Emails to employees, top management team, partners, board members, (potential) investors,…
Company's archive	5.442 documents, approximately 22.000 pages	Dropbox, intranet WE❤MOBILE	Employees and top management team
Observational data	Approximately 275 hours, Approximately 600 pages of observation notes	Principal investigator's notes from attending formal and informal meetings	Analysis for this study
Board meeting reports	15 reports, 249 pages	Founders	Top management team and board members
Sales & Marketing meeting reports	23 reports, 69 pages	Sales and marketing director	Sales and marketing team
Management meeting reports	44 reports, 131 pages	Founders	Top management team
Communication forum employees	26 reports, 78 pages	Reports on intranet WE❤MOBILE	Employees and top management team
Shareholder documents	8 documents, 304 pages	Founders	Shareholders and founders
Versions of the Business Plan	5 business plans, 260 pages	Presented at formal occasions such as board and investment committees	Board of directors and investment committees
Business press articles (press coverage)	10 articles, 12 pages	Belgian newspapers and business magazines	Readers of Belgian newspapers and business magazines
Press releases	30 press releases, 33 pages	Website WE❤MOBILE	Visitors WE❤MOBILE website
Interview key actors	6 interviews, 1.5 hours/interview	Founders	Analysis for this study
Conference video	52 minutes	Taped by professional videographer	Conference attendees

Following the extended case method approach, we started with a profound review of the capability literature. Next, we analyzed the field notes of the participant observation and the documents collected during this observation period, which directed us to the micro-foundations view on dynamic capabilities. Content analyses of the e-mail account of the founders and secondary public data revealed new patterns on a micro level which directed us towards attention based theory (Ocasio, 1997), cognitive dissonance theory (Festinger, 1957) and theories on competing objectives (Eisenhardt, Furr and Bingham, 2010). Secondly, we collated additional data based on initial analyses of field notes, company archives and e-mails. These two "running exchanges," between literature review and data analysis and between data analysis and data collation, (Burawoy 1991: 10–11) are further described below.

The first phase of the extended case study method involves the interplay of existing concepts/theories and analysis of empirical data. While this study started with an extensive review of the capability literature, data analyses point to other relevant concepts and theories in the literature. These concepts and theories in turn provide conceptual frameworks which aid the interpretation of the data (Danneels, 2010). The participant observation notes and the documents collected during the observation period formed the basis for our first data analyses. Based on the board and management meeting reports and on field notes from the participant observation activities, we were able to reconstruct We❤Mobile's story by mapping the most important resource-structuring events on various timelines (changes in recruitment, rounds of finance and technological choices). These initial analyses of archives and field notes revealed that the company was confronted with a radical change in its environment, soon after its VC-round. Because the VCs had invested in a particular business model and had put milestones on that business model, they managed the development of capabilities through the board of directors. However, at the same time, the company needed to develop capabilities to guide a change in business model in order to address the changes in the environment. We defined and described the business model and resource configuration based on the business plan that the venture capitalist originally signed up for and the various board reports in which

the business model, recruitment and investment policy were discussed. The targeted business model and associated resource configuration were based upon the presentation made by the candidate-CEO in January 2010 and the business model / resource configuration of the company he referred to as the direct competitor and benchmark (Mobi). The need for a new model and changes in resource configuration directed us to the dynamic capabilities literature and more specifically the managerial view suggested by Teece (2007) and Zahra, Sapienza and Davidsson (2006) and provided us a framework to map these events on a timeline and categorize them into phases of perception, willingness to react and ability to act.

Since we wanted to gain insight into the micro-foundations of these dynamic capabilities, which we define as the underlying individual-level and group-level actions which lead to dynamic capabilities, defined as the capacity to change the company's business model and resource configuration, we had to investigate the relationships between the key decision makers. The e-mail account of the founders revealed conversations between account managers, software engineers, COO, CEO, the chairman of the board, investors and partners (4622 e-mails spread over a period of 3 years). Two researchers who did not participate in the meetings analyzed this e-mail correspondence and, after various iteration rounds, reduced the list to the 235 most important e-mails that referred to the change in the environment and the subsequent triggering of business model adaptation and associated resource configuration. We mapped these e-mails on a timeline and used the QSR NVivo 2.0 software package to code and analyze the content of these e-mails. The software program aided us in entering codes, examining passages of text in which the codes appeared, and counting code frequency. Analysis of the data collected via participant observation and the e-mail correspondence helped us to formulate an insider view of decision processes and an inductive understanding of actors' perceptions and cognitive maps. These analyses revealed new issues and pointed to relevant concepts and theories. Our study started with the capability literature which, after comparison with the We❤Mobile case, led us to other literature about distinct areas such as micro-foundations view on dynamic capabilities (Gavetti, 2005; Felin and Foss,

2005; Teece, 2007; Felin and Foss, 2011), attention-based view (Ocasio, 1997), cognitive dissonance (Festinger, 1957), and the literature on competing objectives (Eisenhardt, Furr and Bingham, 2010).

The second phase of research required us to continuously move back and forth between data collection and data analysis. The initial analyses through field notes and company archives, on the one hand, and the content analyses of the e-mail correspondence on the other hand, not only led us to other literature streams but also forced us to use already existing but unexplored data sources of our huge data file. For example, in the course of this study, we were directed to the cognitive dissonance literature based on analysis of email discussions between the founders, senior managers, and account managers. After an extensive review of the cognitive dissonance literature, we found explanations for these behaviors at a micro level, which in turn had, according to other company archives, an impact on the events at the macro level. Finally, after the first data analyses, we started to discuss the results in interviews with key people. These were in-depth, semi-structured interviews taking average 1.5 hours each.

In order to organize and analyze our data, we used the QSR NVivo 2.0 software package on the one hand, to centralize and store our various data sources, and developed figures and tables on the other hand. For example, figure 2 gives a brief history of We❤Mobile. Furthermore, we developed table 2 to give an overview of the characteristics of the two business models and the resource configurations ideally associated with these business models. We explain the main features of the business models along the lines of Teece (2007) and their associated resource configurations divided into tangible, intangible and human resources (Helfat et al., 2007). In what follows, we give a brief history of We❤Mobile in a descriptive narrative, so that readers can experience these events vicariously and draw their own conclusions (Stake, 2005: 450). After that we present our findings and move on to the discussion and conclusion section.

2.3 History of WE ♥MOBILE

2.3.1 February 2006 – November 2008: Entrepreneurial phase

Figure 2 shows the history of WE♥MOBILE. The company agreed upon a term sheet with A-round investors on November 9th, 2008. Before that, the company was very much in an entrepreneurial phase during which it did not develop capabilities but did explore the opportunity space (Zahra et al., 2006). The company experimented with open source technology components and had subsequently Business to Business, Business to Consumer and Business to Business to Consumer market approaches. As no clear underlying business model was available, no resources were bundled to optimize the pursuit of the business model and no capabilities were developed. This period is therefore not interesting for the purposes of this paper. In December 2007, the company officially started and began to build a business model, which was the result of the entrepreneurial phase. This business model was further developed through the negotiations with the investors.

2.3.2 November 2008-March 2009 (Term sheet-Deal Closure: Business Model 1)

By the time the company was about to sign its terms sheet, it had developed a software platform which enables the user to make existing desktop websites mobile, add dynamic content such as Flash, and interactive transactions like payments and reservation systems. This platform had three key advantages over existing platforms: 1) the ability to deal with device diversity, 2) five to ten times faster content access time, and 3) user-friendly, interactive mobile sites. At the time, competitors had to adjust websites according to the specific type of mobile device. For example, if a customer wanted its website to be optimally viewable on five types of mobile devices, competitors had to develop five different versions of that website. In contrast, WE♥MOBILE's technology could transform desktop websites into mobile sites for any type of mobile device. In order to retain the maximum user-friendliness, the site automatically adapted to the specific features of the mobile device, whatever brand or model being used. Rather than a simple shrinking of a website, this technology performed a real transformation of the website to make it compatible with any type of mobile device. The level of technological complexity of this approach was much higher

compared with competing technologies, since it allowed thousands of users to view websites with any type of mobile device. Web developers needed training to be able to use the technology platform. WE❤MOBILE's technology reduced the total development time for mobile sites significantly as well as lowering the maintenance costs since it no longer involved multiple websites.

The company's target customers were large web agencies which needed to make mobile solutions for their early adopter clients, in segments such as the media and airline industries. The CEO mentioned in a memo to potential investors:

> *"We focus on partnership deals with web agencies… we will aim for the bigger partners. They seem to get the most value from our toolset which allows them to offer high-quality mobile websites to their existing customer base without spending too much money on upfront licenses and development time – we seem to be better/faster/cheaper than the competition."* (CEO, e-mail January 2009)

In line with this target customer selection, a classic key account management model was installed in order to screen the market and build partnerships with large web agencies. As expressed by an e-mail conversation between the account manager (AM1) and the sales and marketing director (January/February, 2009)

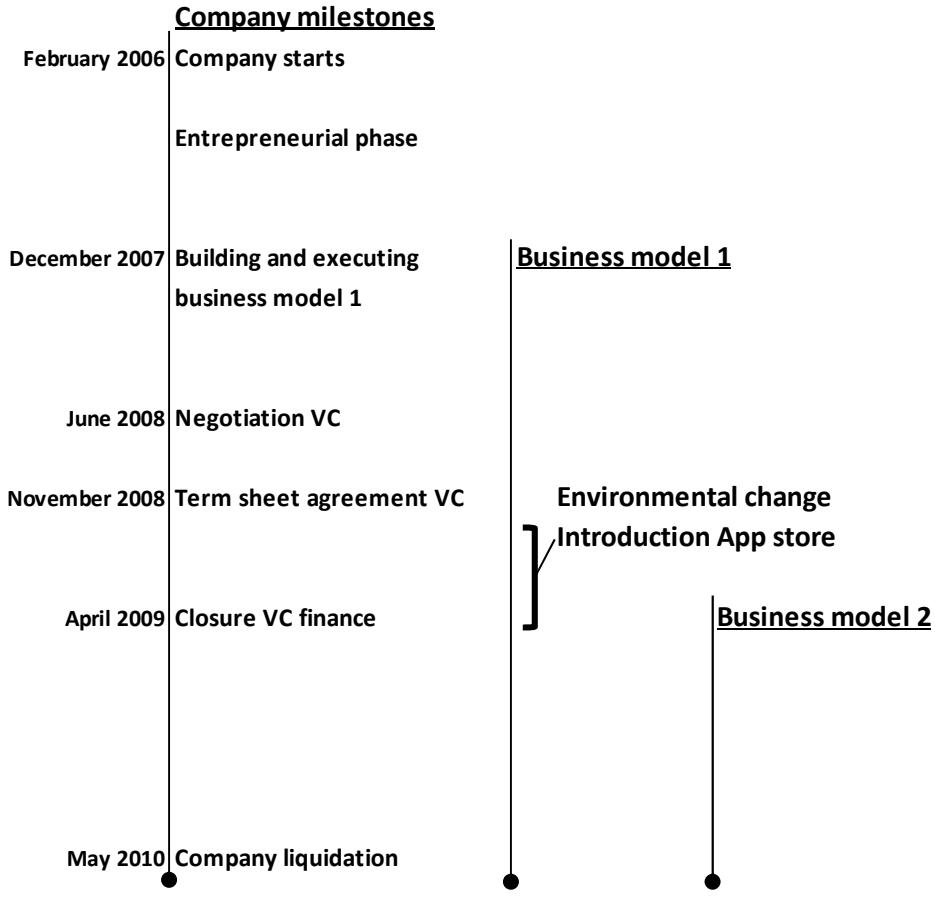
> *"We want to hook up with Digital Agencies (our partners) and we want THEM to use our platform and make it scalable. They will create and develop mobile websites using the platform."* (AM1, e-mail January 2009)

"we are going for the direct sales approach. This means that we expect you to contact UK web agencies and the CEO will accompany you to the first sales talks, starting from the 2nd week of March as all the sales support tools will only be ready by mid-March. You [AM1] have to be picky about who we want to meet because setting up meetings all-over Europe is expensive" (sales and marketing director, e-mail February 2009)

One account manager could manage a maximum of up to ten web agencies because of the complexity of the sales process. Each time a web agency tried to sell a mobile project to one of its clients, the account manager and a software

engineer of WE❤MOBILE had to join the discussions. Next to the revenues from these projects, the company also generated recurring revenues via a license model. The license model was a subscription license based on the type of usage of the platform. The recurring fees from the licenses made WE❤MOBILE attractive to potential investors. The company raised venture capital in April 2009 which would be used to expand the account management model internationally. Soon after the capital investment, the company established an office in the UK and employed account managers in Dubai, India, and the US.

FIGURE 2: WE❤MOBILE timeline



2.3.3 April 2009 – October 2009: Radical change in the environment and the impact on WE❤MOBILE's business model

On July 10, 2008, Apple launched a digital application distribution platform, the "App Store", for its mobile operating system via an update of iTunes. Applications could be downloaded directly from the App Store to a target device

either for free or at a cost. The iPhone 3G, pre-loaded with App Store support software, was launched the following day. Rather than developing applications in-house, Apple provided a software development kit to 3rd party developers who could create applications to run on Apple devices. In the first 6 months, the App Store offered more than 15,000 applications and reached 500 million downloads. By April 2009, those figures had doubled to 30.000 and 1 billion and dominated the 2009 Annual Mobile Summit in Barcelona (West & Mace, 2010). This impact of the Annual Mobile Summit should not be underestimated as it attracted huge press conference, far beyond the technical community. Soon, other platforms for web applications such as Android Market (March 2009) and Nokia Ovi (May 2009) were launched. The spectacular growth of the applications and downloads and the press coverage of the Mobile Summit did bring about a radical change for companies operating in the mobile internet industry. The following quote from a press article sent by an account manager to the management team illustrates this shock:

> *"Only a few years ago… mobile browsers were poor at the time. For most companies, pre-loading applications onto devices was not an option, and downloading and installing applications was a pain for end users. As mobile browsers improved in capability and mobile networks improved in speed and reliability, the industry (and users) started to favor mobile websites over apps. Then Apple came along with the iPhone and the App Store. Suddenly it was easy to download and install mobile apps. Most serious players are following Apple's lead…"* (Press article April 23th, 2009 sent by AM1 on May 28th, 2009)

The industry became hungry for applications which provided the possibility of interactive engagement with users, a feature which is much more complicated to create with mobile sites. In addition, an important advantage of applications over mobile websites was a more advanced functionality which made full use of a smartphone's intelligence. WE❤MOBILE felt this change in the market, as illustrated by the following e-mail conversation in April 2009 between the CEO and AM1:

CEO: *"sell our fully managed solution to web agencies. No more, no less. We have to hit the street with our proposition, meet them, listen to them, convince them… whatever it takes."*

AM1: *"[CEO], all the guys are working very hard – trust me – to do this through 1) e-mails, 2) telephone calls, 3) contacts to LinkedIn Groups… Not a single one [web agency] has shown any interest (or even answered). But, hey, I am trying to keep the morale and keep on trying. I am desperate for some help on this."*

The impact of this industry transition from mobile sites to applications had a devastating impact on the company:

"The overwhelming majority of web agencies started to support iPhone and other smartphones. They dropped everything else. They no longer wanted to pay for our service (which transformed websites). Their customers wanted trendy applications for iPhone… The demand for our solution vaporized. Revenues dried up." (Interview with COO, press article 2010).

"Instead of a couple of competitors, WE ❤MOBILE suddenly has hundreds of competitors who are all developing apps. One of our biggest threats is the iPhone SDK (Apple's development kit for apps)." (AM1, email May 2009).

This change in the market undermined WE❤MOBILE's business model, which was based on a high-end, powerful solution aimed at large agencies. It took the company several months to become "aware" of this threat in the market, which forced it to revisit its business model. We will further analyze in the next section why this process of perception creation took so long. As the company became more aware of the changes in the environment, it did develop a new business model from the bottom up. Using "Mobi" as a benchmark, it spotted the market segment of low end customers (e.g. cities, churches,…) as an interesting segment for their technology. In contrast to the technology platform used for high-end customers, this product needed to be design in a user friendly way, which wouldn't require training and intense support. The market approach had to change from channel management using key account managers towards online marketing. These changes in technology and sales approach had significant

implications for the number and profile of the employees needed in the ideal resource configuration to support this business model. As the technology required was less sophisticated, the number of software developers could drop from eight to three, and only one employee would be needed for the server maintenance and hosting. A designer would have to be hired to assist the development of the GUI (user interface). The new sales approach implied that the two account managers were no longer needed, and had to be replaced with one online marketing manager. The profile of the CEO in the new resource configuration would also change. Whereas the existing CEO had a very technical profile, a new CEO with extensive experience in the global mobile internet market should be recruited. The key differences between the business model and resource configuration needed to serve large web agencies and the one needed to serve small web agencies is summarized in table 2.

TABLE 2: Characteristics of resource configuration 1 vs. resource configuration 2

	Resource configuration 1	**Resource configuration 2**
Resources	**Financial resources** Pre-seed and Seed : 1 mil EUR VC round series A > 4 mil EUR **Human resources** <u>Top management:</u> CEO/founder (Professor in ICT) Director Sales and Marketing/founder (Professor in Management) COO (Ing., 24 years' experience in managing projects) <u>Operational management:</u> 1 Program manager, 1 Product manager, 8 Software developers, 2 Maintenance hosting servers, 3 Account/sales managers, 1 Marketing consultant **Technology** - Proprietary software platform offering semi-automated tools to deliver content on any type of mobile device	**Financial resources** 500K EUR **Human resources** <u>Top management:</u> CEO/VP marketing (MBA, 29 years IE, 5 years EE), COO/ VP engineering (Ing., 24 years IE, 0 years EE) <u>Operational management:</u> 1 User experience designer 1 Online marketing 3 Software developers **Technology** - Simple, user centric web development tool, with a friendly interface to mobilize existing websites
Business Model	*MSP (Managed Service Provider) Partner model* **Value Proposition** - Proprietary technology platform that decreases the amount of work of the web developer with 50-80% when mobilizing existing content and reduces maintenance costs with 50% for the end user **Customer Segment** - High-end, larger web agencies as partners, big ticket corporates (such as banks,	*SAAS (Software as a Service) Online marketing model* **Value Proposition** - User friendly, mobile web development tool to transform Open Source powered websites in no time and maintain them at low cost **Customer Segment** - Low-end, smaller web developers who develop websites for cities, public

airlines, media companies…) as end customers **Channel** - Account managers screen the market and establish partnerships with large web agencies and system integrators (accounts). **Customer Relationships** - Dedicated personal assistance and different forms of SLAs. Co-selling with the partners, system integrators and web agencies **Revenue Streams** - Revenues come from selling licenses to web agents - Commercial license= 7000 EUR/account, average of 10 accounts/web agent	agencies, social enterprises, micro-enterprises… **Channel** - Online marketing using SEO, SEA, …. - Customers are reached online via the product and company website **Customer Relationships** - From self-service to automated services (= semi-automated Q&As to solve problems) **Revenue Streams** - Freemium model (free, personal premium and commerce version) - Price ranges from free to 50/month

2.4 Findings

The above history shows that WE❤MOBILE faced a sudden and abrupt environmental change, to which it would have to respond if the company wanted to stay successful. Despite its success in building up a sound resource configuration and associated business model during the pre-App Store period, WE❤MOBILE failed to adapt its business model and resource base to the changed environmental conditions. To organize our findings as to why WE❤MOBILE didn't succeed in developing a dynamic capability, we adopt the managerial process view on dynamic capabilities of Zahra et al (2006). These authors distinguish between three managerial processes of dynamic capability development: 1) the founder/management's perception of opportunities to productively change existing resource configurations, 2) their willingness to undertake such change, which entails a dedication of the management to strategize around change decisions and 3) their ability to implement these changes, which requires commitment from them to execute changes. Figure 3 illustrates the structure and ordering of the data and starts from these stages of dynamic capability development to show the challenges and possible responses for each stage. Table 3 presents representative quotations and events that substantiate these identified challenges en responses.

FIGURE 3: Data structure

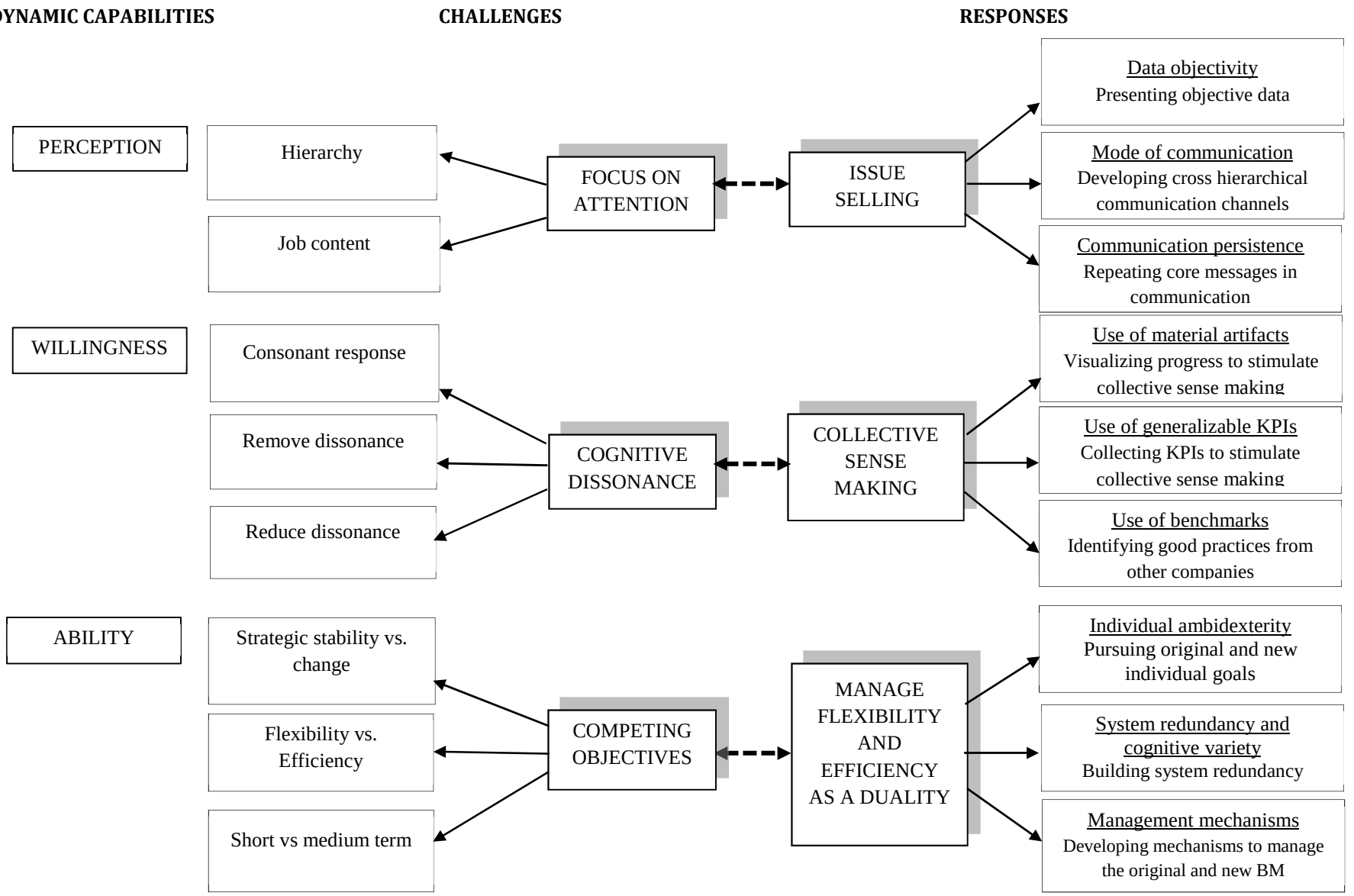


TABLE 3: Representative Quotes, Events and Archival Entries underlying challenges and responses

Stage 1: Perception		
FOCUS OF ATTENTION	**Hierarchy**	CEO: *"sell our fully managed solution to web agencies. No more, no less. We have to hit the street with our proposition, meet them, listen to them, convince them… whatever it takes." (email March, 2009)* Response AM1: *"[CEO], all the guys are working very hard – trust me… Not a single one [web agency] has shown any interest (or even answered). But, hey, I am trying to keep the morale and keep on trying.*
	Job content	May 11, 2009 COO presents the technology roadmap at the board meeting and explains that the technology can improve by including rich content (video content) and a higher level of interactivity (Clarysse and Kiefer, 2011: 222) AM1 focuses on a simple, user centric web development tool, with a friendly interface: *"…Look at their revenue strategy: you pay a small fee and then you can use the tools to develop mobile apps. The technology is very simple and it is easy to use! The more I think about it, the more I like the idea! (E-mail May 4, 2009)"*
ISSUE SELLING	**Objective information**	- Collect customer testimonials March 22, 2010 The CEO presents an OSMOBI marketing report. The freemium version of OSMOBI was downloaded 1500 times in 3 months. - Use of external experts February 26, 2010 JC, a London-based expert in online marketing and the prospective new CEO (pending continuing funding) presents a new version of the business plan to convince the investors in the board of directors
	Mode of communication	Analyses of the attendees of and presentations in management meetings, board meetings and investment committees show that account managers only present in management meetings and very occasionally in board meetings. CEO/COO/Sales and marketing director present in management meetings and board meetings but never for investment committees.
	Communication persistence	The official board reports and the informal notes of our principle investors (September 2009, October 2009, November 2009) show that similar slides are used each time to convince the board member of the changing environment
Stage 2: Willingness		
COGNITIVE DISSONANCE	**Consonant response**	AM2: *"The trade fair in Amsterdam was a big success. I have at least 10 new leads for partnerships to follow up on. I am very sure that by the end of the year I will meet my targets. I only need sufficient support from the back office"* (E-mail from AM2 to Sales and marketing director, October 21, 2009)
	Remove dissonance	CEO: *"[COO] brought up the project business, again!*

		I made it clear that we're not going to invest in this anymore and that all efforts are focused on the development of OSMOBI… I have the impression (and am convinced) that he [COO] doesn't really believe in OSMOBI and he just wants to do projects. He says "yes" during meetings but actually thinks "no", which is reflected in e-mails sent two hours after the meeting." (email December 13, 2009)
	Reduce dissonance	Board reports (September 2009, October 2009, November 2009 and December 2009) describe the discussion on OSMOBI but still include a section where they evaluate the number of signed partnerships.
COLLECTIVE SENSE MAKING	**Use material artifacts**	September 27, 2009: CEO presents new functional prototype at board meeting October 22, 2009: COO and technology team develop launch OSMOBI at online marketing conference
	Use generalizable KPIs	Product manager: *"In attach the overview of usage of OSMOBI. Main conclusions: everything is catching back up with figures of Friday. Only the number of launched projects is low. Don't quite know what could be the reason, I will follow up… (email October 20, 2009)"* Response AM1 send to management team: *"Thanks to [product manager], we have now a clear snapshot of where OSMOBI stands today, just after the official launch…"(email 28 October2009)*
	Use benchmarks	March 6, 2009: AM1 e-mail to the management team which illustrates the Canadian company Mobi as a benchmark (see appendix A): *"…This is a clear example of how a proper GUI (graphical user interface) can make your product look better…"*
Stage 3: Ability		
COMPETING OBJECTIVES	**Strategic stability vs change**	Board meetings (September 27, 2009; October 2009, November 2009, December 2009) show that the investment managers in the board focus on the agreed milestones focus on the engineering roadmap, the technology roadmap and a sales pipeline that support these milestones. 80% - 90% of the various board meeting reports cover these reports. 10%-20% of the board meeting reports discuss strategic changes needed to avoid milestone underperformance. Different forms of change such as technological choices are considered to be a necessity.
	Job Flexibility vs Efficiency	CEO asked his engineers to collect market feedback on the new product OSMOBI while at same time focus on their work on the account management model and follow the technology roadmap in order to meet the milestones of the investors. *"…. I expect all engineers to be active on the various blogging forums. We use Netvibes and Google Alerts to be alerted when web developers blog about our service or the one of our competitors so we can follow this up very closely. In addition, I expect that everyone to send at least one twitter message a day to promote the product. Of course this does not mean that you have to neglect your day-to-day work….."* (CEO WE❤MOBILE e-mail 8 December 2009)

	Short vs medium term	Internal documents (May 2009) dropped on the intranet and observation notes of biweekly communication forum to the employees (May 15, 2009) show that engineers were asked to follow the technology roadmap on the short term. The technology roadmap presented by the COO at board meeting of May 11, 2009 explains that the technology can improve by including rich content (video content) and a higher level of interactivity (Clarysse and Kiefer, 2011: 222)
MANAGE FLEXIBILITY AND EFFICIENCY AS A DUALITY	**Individual Ambidexterity**	A context to stimulate individual ambidexterity was created. Priorities were set to facilitate focus. AM1 could increasingly focus on the change process while receiving assistant support to pursue original goals. He received a budget to experiment, while additional budget was allocated to pursue the traditional milestones. March 20, 2009: S&M manager sent email to AM1: *"…you can spend some more time exploring our business case with me. I asked* Engineer 3 *to take over the London account X. They are more technical oriented anyhow. He is happy to do so, it gives him a way to visit London*
	System redundancy and cognitive variety	Email analysis indicate that redundancy was built into the system as AM1 could set up a Tiger group for OSMOBI, while the traditional BM still continued to be the dominant focus. So, if AM1 spent some days on the prototype, the other projects could still be delivered on time. October 17, 2009: AM1 e-mail to the S&M manager: *"…I am pretty confident that we go online beginning of December. COO gave me Engineer 1 and Engineer 2 for the next two weeks to build the GUI back-end. He could reschedule their work so they can focus on OSMOBI…"* Second, cognitive variety was built into the system by recruiting very diverse people. For instance AM1 had no industry nor job specific experience, but a vast amount of generic experience (he did an MBA and worked for five years as a systems engineer in an aviation company) while AM2 had lots of industry and job specific experience but no generic experience across industries and functions (she worked 10 years as account manager in different ICT start-ups (*Source: CVs).*
	Management mechanisms	E-mail analyses indicate that the AM1 and Sales and marketing director set up a tiger team to develop an alternative more simple and easy to use technology which is called the Drupalgoesmobile project (which eventually resulted in OSMOBI)

2.4.1 Perception: Managing Attention

Zahra et al. (2006:918) state that the first stage of dynamic capability development refers to the individual entrepreneur's "perception" of opportunities to productively change existing resource configurations. They use an upper echelon perspective by assuming that the key management or founding

team behavior does predict the company's behavior. This perspective has been criticized by Gavetti (2005) and Danneels (2010), who show that the development of capabilities might depend on perceptions that differ across the various hierarchical layers of the organization. In our analysis of how WE❤MOBILE as a company becomes aware of changes in the environment, we go beyond the founding team and also consider the role of individuals at other hierarchal levels, both below (account management level) and above the founding team (director level and investment committee). The first signals of change were perceived at the level of the account managers. The London-based account manager (AM1) – encountered significant problems when he approached key accounts in the UK market. Despite the interest in the WE❤MOBILE technology platform among the major London-based web developers, many of them increasingly hesitated to set up a partnership. In his weekly sales and marketing meeting with the sales and marketing director, AM1 stated:

> *"The WE❤MOBILE technology is based on the wrong assumptions. Large customers ask web developers for an iPhone app. Why would the web developers use our technology if they can get £ 50,000 to build an app? They do not care that their customers only reach a small percentage of users with that app. Customer is king"* (Sales & Marketing Meeting, 14 April 2009)

AM1 convinced the sales and marketing director about this change in the environment by referring to his key account testimonials. Although the sales and marketing director not immediately disagreed with AM1's perception of the environment, he also had to alert the other two members of the management committee. It would be much easier to do so if he could already present the other members of the management committee with "hard data" and a potential response to the changed environment, in order to make a strong case that AM1 was not trying to hide underperformance in his own sales and marketing efforts. To further develop this, he joined AM1 to collect information from London-based web developers. Two months after the April sales and marketing meeting, the sales and marketing director gave a presentation about the changed

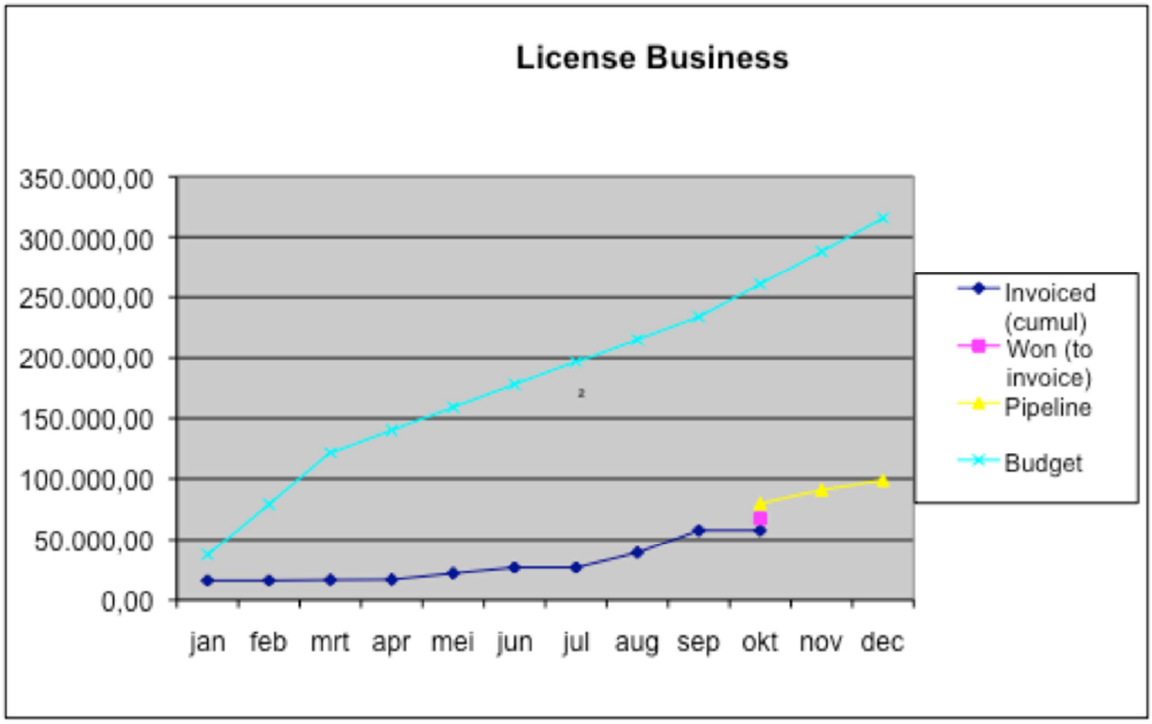
environment to the other members of the management team, using testimonials and quotes from former accounts and AM1's efforts to find a response.

Although the management committee did buy into the idea of the need for a new approach, its members were quite resistant to change anything in the old business model which had been agreed upon with the investors. So, a strategy was developed to draw the attention of the investment managers on the board of directors to the changed environment. AM1 received a new function, releasing him part-time from his account manager role. The new function of AM1 was to get a better understanding of the new iPhone apps trend in the UK market and explore how the company could develop a response to this change in customer preference. The CEO asked for some convincing material to present so he could alert the directors already at the next board meeting on July 27, 2009. He knew that just issuing an alert signal about the environmental changes would not be sufficient to focus the board members' attention, as they were less embedded in the market nor did they understand the technology in depth. His strategy was to put the changes in the environment and the development of a potential solution always at the agenda of the board meetings. Every board meeting after 27 July deals with this topic. In addition, he requested a visual prototype which could become part of the eventual solution, and which would help the board members understand the difference between the "mobilizer" used as a technology platform for large accounts and the "instant mobilizer" that could be launched as a specific, easy-to-use, plug-and-play product for smaller accounts. The board members did appreciate the efforts of the company to segment the market, but did not immediately consider this to be a change in the market, which would force the company to change its business plan.

Two months later, the CEO presented the new "functional prototype," now called OSMOBI (Open Source Mobilizer) at the board meeting on September 28, 2009. Although the board members liked the OSMOBI product and its revenue potential, this was not tantamount to a clear perception that the business model and associated resource configuration needed to change. The minutes of the board meeting on September 28, 2009 mentioned:

"The different OSMOBI revenue streams constitute a speeding-up of the initial business plan, not a change. We always had the intention to develop a product for the low end market. Now this investment will be made sooner. The forecast on partnership revenues stays as in the business plan" (BOD meeting, September 28, 2009)

FIGURE 4: Budgeted, Realised and Forecasted Revenues from Licenses



Source : BOD, 27 October 2009

It was only at the next board of directors meeting (on October 27, 2009) that the investment managers started to perceive how much the environment had changed and did feel the need for the firm to change its focus from partnerships to the new OSMOBI product. Figure 4 shows that revenues from partnerships not only lagged behind the figures budgeted in the initial financial plan, but also leveled off. At this point, the CEO started to realize that more effort needed to go into OSMOBI product development for the new market segment, and his willingness to further invest in OSMOBI increased. We will further explore this in the next session where we cover the "willingness" to develop change rather than the "perception" element.

It was only at the management meeting on December 14, 2009, in preparation for the board scheduled later that month, that the CEO articulated the need for a radical change in strategy, with OSMOBI as the lead product. He then proceeded to draw the attention of the other board members in this direction. The board was still not convinced that the environment had changed that much and upon suggestion of the president of the board, a London-based expert in Mobile Technology was contacted to act as a consultant for the company and maybe a potential CEO if a new direction needed to be taken. The board on February 22, 2010 was fully devoted to the new challenges that were offered by the environment and OSMOBI as a potential answer to these challenges. The London-based expert made a convincing presentation about how the Apple App Store had changed the environment, which at the same time had created opportunities for the booming business of m-commerce and defended OSMOBI as a reasonable attempt to formulate a response to this changing environment. At this board meeting, the investment managers decided this should be presented to their investment committees, since the next tranche of investment would be needed in a couple of months. They did not yet feel comfortable presenting the new business model themselves to their limited partners, but thought that the London-based expert would be credible, upon the condition that he also would commit himself as a potential CEO if they did buy the idea. In March 2010, a meeting was therefore planned with two of the three investors, where the new management team (new potential CEO, CEO, and COO, and the sales and marketing director who would now take a role as a non-executive director) would have to present the new business plan. The third investor, a public fund, did not have an investment committee of limited partners which met on a regular basis. At the BOD on March 26, 2010, the investment managers confirmed to the company management:

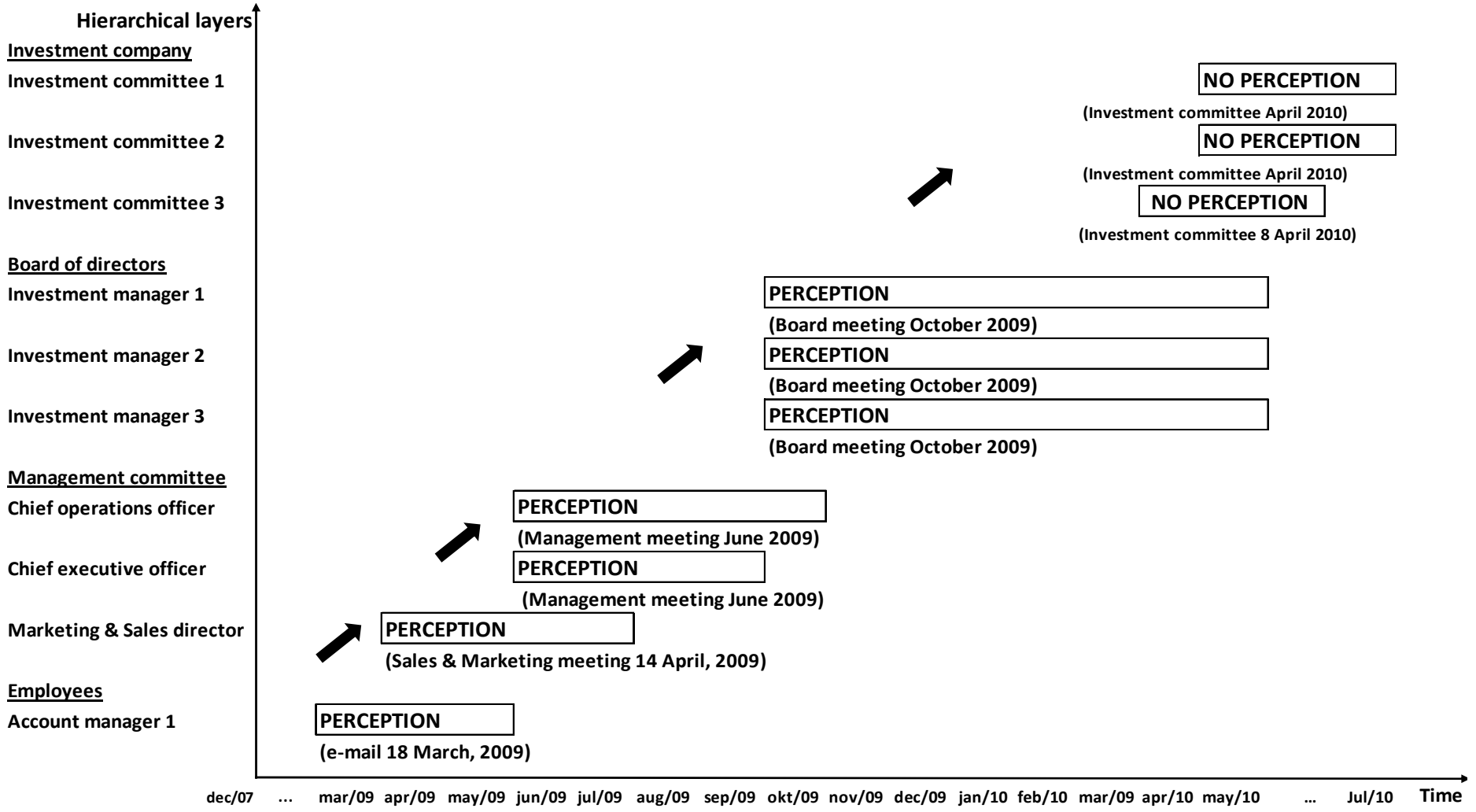
> *"The roadshow you did at our investment committees was successful, our investors liked the idea of a turnaround… I [the public fund investment manager] discussed the new plan with my colleagues and we see no problems for obtaining the next round of financing of 1.5 million Euros"* (BOD meeting, March 26, 2010)

However, the investment team of the public fund ultimately decided in its meeting on April 8, 2010 that it would not release the next 500 thousand Euros, as the milestones in the new business model had changed from those in the original business plan. The official communication from the public investor to WE❤MOBILE read as follows:

> *"Our investment team has decided not to further invest in the company, as the industry expert in the team has expressed his disbelief in m-commerce and mobile transactions as a potential source of revenues. The fact that the milestones in the business plan have not been met supports this concern"* (e-mail from investment manager to CEO, 8 April 2010)

What is clear from the flow of communication and the above story line is that the different layers in the organization do not get aware of the environmental changes at the same moment in time and, related, it does take them longer to get aware, the more distant they are from the company's core activities (see Figure 5). We see that AM1 perceived the change in March 2009, soon after he started working for the company, whereas the investment managers on the board of directors only perceived this six months later. Higher-level decision makers, such as investment managers at board level, are more distant from the action, thus diminishing their ability to interpret "novel experiences". For example, the board acknowledged that something was changing in the market, but the attention they paid to this change was limited, as they kept focusing on activities related to the existing business model.

FIGURE 5: Attention of decision makers



The importance of organizational hierarchy in decision-making has been theorized in the attention-based view of the Firm (Ocasio, 1997), which stipulates that what decision makers do depends on their focus of attention rather than processing information. The focus of attention is determined by the situation in which they find themselves, which again is influenced by the processes the organization has put in place. This view argues that firm behavior is the result of how firms channel and distribute attention across various hierarchical layers in the organization. In other words, the organization is presented as a system of distributed attentional processing (Ocasio, 1997; Ocasio, 2011).

Attention is defined by Ocasio (1997:189) as the noticing, encoding, interpreting and focusing of time and effort by organizational decision makers on both (a) issues, the available repertoire of categories for making sense of the environment; problems, opportunities and threats and (b) answers, the available repertoire of action alternatives, such as proposals, routines, projects, programs and procedures. Managers across the organizational hierarchy focus attention on different activities and aspects of the firm's agenda. The case above shows, in great detail, that the attention which decision makers at various levels pay to the issue differs greatly according to the situation they are in (i.e. account manager, exec manager, investment manager, limited partner). Developing a dynamic capability at company level implies that a system of distributed attention is installed which directs the attention of all different levels in the hierarchy towards the environmental challenge (the issue) and towards finding an answer to that issue. The case shows that the more distant the decision maker was from the action, the more information and communication tools were needed to draw his/her attention. For instance, the sales and marketing director accompanied AM1 to collect quotes from the different customers in order to convince the other members of the management team. Later, a visual prototype of the potential solution was developed to communicate with the board members and an external expert was brought into the board to present his expert opinion on how the environment did change and what the opportunities were that resulted from that change. Directing attention includes (a) actions such as exploring the

landscape by doing preferred witness research (Clarysse and Kiefer, 2011); (b) using communication tools and channels such as prototypes, testimonials and even invited experts at board level; and (c) developing procedures which then channel this attention, such as inviting management teams to investment committee meetings (Joseph and Ocasio, 2012). These actions, communications and procedures are moves used by employees to affect and direct the attention of others to and understanding of changes that have implications for firm performance (Dutton and Ashford, 1993). This process is referred to in the Attention Based literature as "issue selling" (see figure 3) and constitutes the initial step in the change process of which success depends on how effectively change agents get the right people involved (Dutton, Ashford, O'Neill, and Lawrence, 2001). This leads us to the following proposition:

Proposition 1: The extent to which the firm is able the sense opportunities and threats in the environment, as a first step in developing dynamic capabilities, will depend upon the extent to which the firm is able to manage attention across the different hierarchical layers of the organization through a process of issue selling.

2.4.2 Willingness: Managing Cognitive Dissonance

In the previous section, we have shown that it is key to get attention aligned across different hierarchal layers in the organization to optimize the sensing of change in the environment. Next, dynamic capabilities imply that the organization develops a "willingness" to change the business model and move from one resource configuration to the next.

Our case data shows that despite the fact that "perception" was created, this did not mean that everybody was "willing" to change the business model and the company's resource configuration. WE❤MOBILE employed two account managers (AM1 and AM2), but each reacted very differently to the fact that they did not meet their targets. London-based AM1 analyzed the problem, observed the environment and looked for a potential solution, which eventually became OSMOBI.

In contrast, AM2 tried instead to meet the targets set for the partnership business model by working harder within her role as an account manager. On Wednesday, October 21st – more than 6 months after AM1's e-mail from the London branch – she e-mailed the following to the sales and marketing director:

> *"The trade fair in Amsterdam was a big success. I have at least 10 new leads for partnerships to follow up on. I am very sure that by the end of the year I will meet my targets. I only need sufficient support from the back office"* (Mail from AM2 to sales and marketing director, 21 October, 2009)

Her belief in the partnership model was strengthened by her signing the first contract with a partner one week after the Amsterdam visit. Figure 6 and 7 show the results of the content analysis of the email conversation they had with the management of the company. Whereas AM1 increasingly talks about OSMOBI and the new solution to the changed environment, AM2 continues to put her attention towards exploiting the account management model she started in.

The key difference between AM1 and AM2 as business developers was their previous work experience. AM2 had over ten years of experience as an account manager in ICT-related environments and made use of a whole battery of routines and contacts from the past. In contrast, AM1 was an engineer who wanted to get out of engineering and had therefore pursued an MBA. Straight after the MBA, he started to work for WE❤MOBILE. He used his newly developed management skills to analyze the situation and concluded that the environment had changed.

This difference in how people react towards challenges in the environment is also observable between different levels of the organization. The sales and marketing director had experience in managing new ventures (he had been CEO of a new venture before) whereas the CEO of the company had considerable experience as a CTO of a relatively young technology based company in the US. He had joined that company three years after its founding, so he was proficient at developing stable routines in a growing environment, with a focus on technology development. Again, both reacted in a very different way towards the changes they sensed in the environment.

FIGURE 6: Email Count AM1

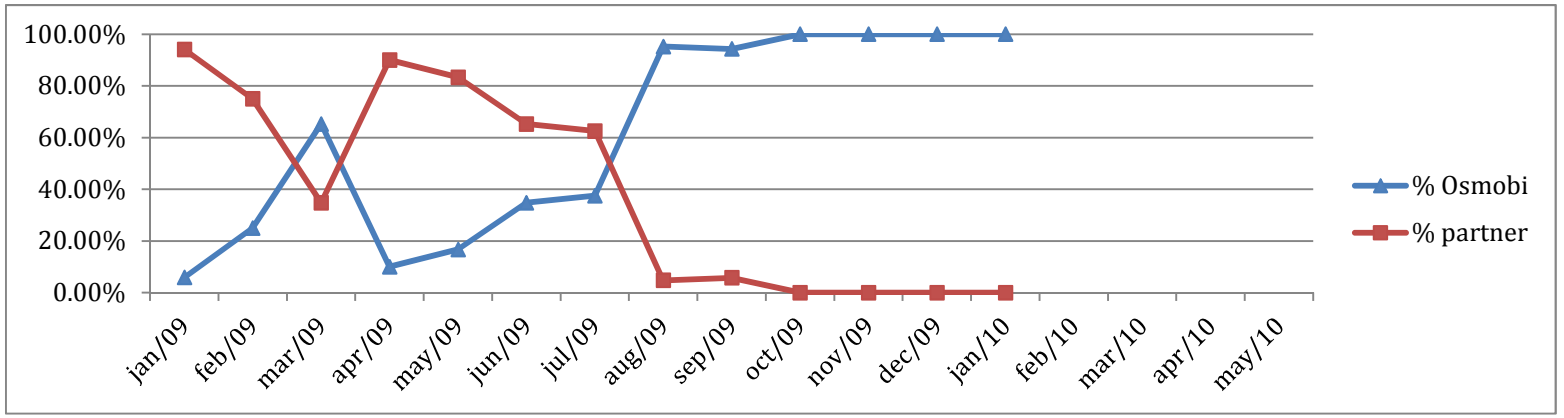
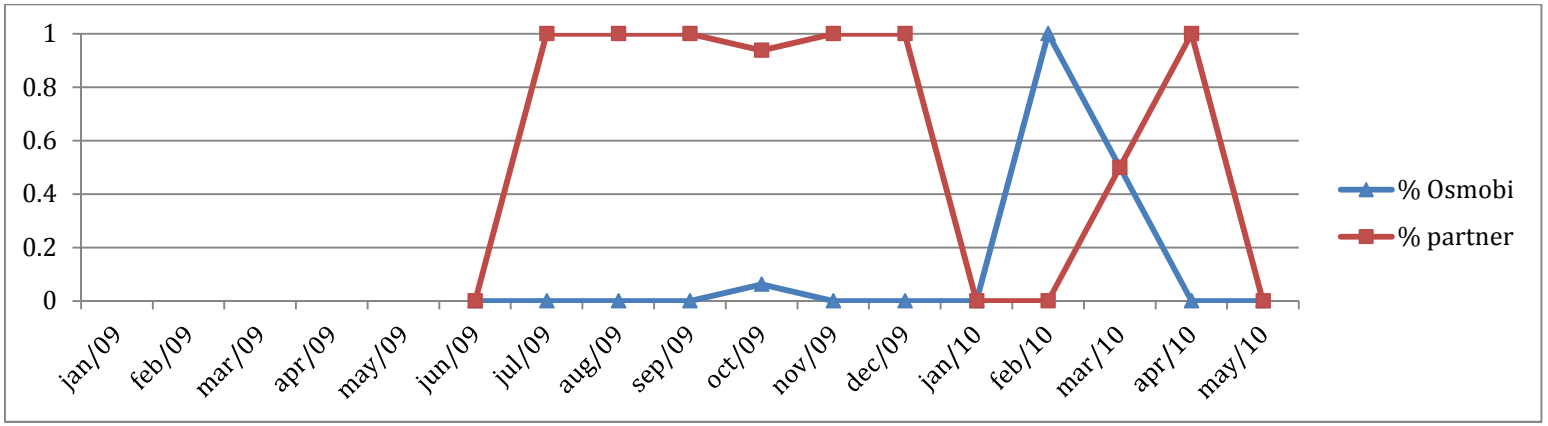


FIGURE 7: Email Count AM2



The sales and marketing director sent the CEO an e-mail in December 2009 in which he challenged the assumptions underlying the existing business plan, in light of the new developments in the market. He realized that the current sales approach via account managers could never work in a changed market where customers were no longer interested in complex, high-end technology but had a strong appetite for apps. Therefore he suggested departing from the old business model and convincing the board to focus mainly on OSMOBI and the new business model. Despite the fact that he recognized the changes in the environment, the CEO's reaction was rather surprising:

> *"I read your [*sales and marketing director's*] email with great astonishment. Unless I didn't get it, basically you're raising doubts about our approach and overall strategy!"* (CEO e-mail, December 2009)

At no point in time does the CEO seem to have realized that, as a response to changes in the environment, OSMOBI would also require redevelopment of the firm's the resource configuration. Even in the company's final months, he presented the following story to the board of directors:

> *".....CEO starts the meeting with the good news that WE ❤MOBILE has managed to be elected for an EC project.... CEO gives an overview of the take up rate on OSMOBI (free version). He presents the funnel of over 8000 visitors leading to 1200 mobile websites in the air at the moment of presentation and 7 paying premium sites.... JC is presented as the new senior VP in sales and marketing and future CEO.... He covers the main issues that have to be tackled in the business case, including the product development map which is needed to go from OSMOBI towards OSMOBI m-commerce. Investor 1 asks CEO whether the technology needed for the m-commerce version is totally different from the one embodied in OSMOBI. COO answers that indeed quite some extra development work needs to be done....CEO argues that 1.5 million Euros extra is needed to finance the further development of OSMOBI and to continue the technology roadmap...."* (Excerpt from BOD minutes February 26, 2009)

The excerpt above shows that even at the moment when the different hierarchical layers (except for the investment committees) were convinced that a new business model was

needed, and after presenting JC, the London-based expert, to the board as the prospective new CEO (pending continuing funding), the current CEO opened the board meeting by announcing that the company had won R&D funding from the EC (which meant only 50% financing) to further develop the roadmap associated with the old business model and reflected the routines he was familiar with from his previous job as a CTO (i.e. building technology roadmaps and bidding for funding to finance these). The COO, who had over 20 years as a project manager in an ICT company, also reacted in a similar way to the environmental change. His job had always been to manage complex engineering projects and deliver excellent quality. At the BOD on February 26, he quantified the amount of work needed to turn OSMOBI from a functional prototype into a commercial product (see quote above, where 1.5 million Euros was requested from the board). Note the difference with respect to the e-mail sent by AM1 to the sales and marketing director nine months earlier (see appendix A) where he refers to Mobi as the role model for WE❤MOBILE. Mobi became successful with a product which was technically inferior to OSMOBI at that time.

Also at board level, we observed that the investment managers responded to the change in the environment by developing responses which suited their comfort zone. The two investment managers from the lead investor had considerable experience in industry (over 20 years) as VP sales and marketing of a company active in digital projectors and digital displays. That company's business model was focused on account management. Throughout the different board meetings, a significant amount of time was spent fine-tuning the KPIs for the account managers and the numbers which needed to be reported. The investment managers also liked to regularly attend technical events to meet the different accounts. However, none of the two investment managers had any experience in online marketing, which was an essential element of the new business model. Nor did they have experience with start-ups (it was their first A-round investment and the rest of their portfolio was in B- and C- rounds). They used their existing routines and procedures to optimize account management and general management in the new venture. Although they bought into the idea of OSMOBI as a new product in the environment, they did not think about the change in business model and associated resource configuration.

These examples indicate that individuals in the company were aware of the need for a change in business model, yet they did not want to give up the old business model. The reason behind this seems to be that the old business model in which they had invested either money and/or effort (as a founder, investor, manager, employee, etc.) fit neatly within the cognitive maps or heuristics they had constructed through their past experiences. Previous research has put forward the importance of cognitive maps in explaining dynamic capabilities. Gavetti (2005) for instance referred to them as important foci of attention. Managers typically rely on their long-held, institutionalized beliefs when confronted with new, ambiguous information. Fundamental changes in the market, such as the introduction of Apple's App Store in relation to WE❤MOBILE, require a new strategic logic which was not aligned with cognitive maps of the key decision makers. Kaplan (2008) has further developed these cognitive arguments within the attention-based view of the organization, and shows how the cognitive map of CEOs determines the way they shape responses to technical change. Cognitive maps can be seen as heuristics and routines which people use to make sense of signals from their environment. For instance, AM2, the second account manager at WE❤MOBILE, interprets the bad sales results as an indication that more effort must be invested in account management, and uses routines developed in her previous job as a response. However, OSMOBI needs online marketing in order to be promoted effectively, and is thus very distinct from her cognitive map. Similarly, the CEO had previously worked in a high-tech company where he developed routines to build and execute technology roadmaps and manage his engineers to develop cutting-edge technology. But OSMOBI needs a simple solution with a user-centric design, something very distant from his cognitive map. We find a similar cognitive tension at the level of the investment managers. In the following press release, the investor announces that WE❤MOBILE will now focus on a different market segment, yet the old partnership model will not be abandoned:

> *"[Company] supplies advanced, tailor-made mobile projects and its strategy is mainly based on Partners offering end-to-end mobile development. [Company] also decided to make its source code available to the development community, although the company retains its traditional, commercial solutions".* (Press release May 26, 2009)

In sum, although the different decision makers at WE❤MOBILE acknowledged the need for a reaction to the changed environment, they did not leave their comfort zones, i.e. the old business model which neatly fit their cognitive maps. Instead, they see the new product, OSMOBI, as an add-on to the old business model. The persistence of cognitive maps is illustrated in the following e-mail from the CEO to the sales and marketing director regarding the COO's reluctance to embrace the new strategy:

> *"[COO] brought up the project business, again! I told him over the past couple of weeks that the project business doesn't work because our technology is too complex, and web agencies don't have deep pockets… I made it clear that we're not going to invest in this anymore – do we need to keep our account managers – and that all efforts are focused on the development of OSMOBI… I have the impression (and am convinced) that he [COO] doesn't really believe in OSMOBI and he just wants to do projects. He says "yes" during meetings but actually thinks "no", which is reflected in e-mails sent two hours after the meeting."* (email December 13, 2009)

We can explain this behavior using the theory of "cognitive dissonance" (Festinger, 1957; Cooper, 2007). Cognitive dissonance theory states that if a person holds two cognitions that are inconsistent, he/she will experience dissonance and will try to reduce in one of three ways: (1) remove dissonant cognitions; (2) add new consonant cognitions to it; or (3) reduce the importance of dissonant cognitions (see figure 3). The theory's main context lies in individual and social psychology, but it has been widely used in marketing and, to a lesser extent, in management, where scholars used it in the early nineties to explain resistance to change (Telci, Maden & Kantur, 2011). The reaction of decision makers in the firm who possessed strong cognitive maps was to reduce the importance of the new, dissonant cognition by keeping the old cognitive map. Individuals who are confronted with new information (i.e. the changed strategic logic from account management to online marketing) feel unease with the mismatch between their cognition (based on account management) and the new cognition (based on online marketing), and thus tend to neglect it (Hodgkinson, 2011). Although dissonance between cognitions should signal a need to re-evaluate the interpretation of disruptive events, managers often feel unwilling to abandon their embedded beliefs and instead avoid the cognitive inconsistency (Zimbardo and

Leippe, 1991). New ventures which go through a process of transition from one strategic focus to another require leaders to make a significant cognitive shift from the old interpretive scheme to the emerging reality (Ambos and Birkinshaw, 2010). Such a transition takes a significant period of time, as it requires discussions and internal negotiations between decision makers to build a shared understanding of the new market circumstances. To create this shared understanding, WE❤MOBILE developed first a visual prototype presented at its September board meeting, then a functional prototype, presented at its December board meeting and eventually collected data such as number of downloads, from having its functional prototype in the market place to back up the new business model. In appendix A is the mail sent by AM1 to the sales and marketing director which illustrates the Canadian company Mobi as a benchmark to develop the prototype and change to a new business model (see table 2). The prototyping and market testing was an extremely important factor in creating "willingness" to change. As the individual decision makers could not fall back on their own cognitive maps, they had the tendency to minimize the change in the market and stay within their comfort zone. Coming up with understandable "data" based upon market tests of the functional prototype showed them the potential of this.

The use of material artifacts such as prototypes has been shown to support the transition from individual to collective sense making in an organization (see table 3; Stigliani and Ravasi, 2012). Collective sense making reduces the cognitive distance between individuals and allows companies to seize opportunities in the environment (Cornelissen and Clark, 2010). Especially future oriented or prospective sense making which focuses on the circumstances when a group of people or an organization engages in forward-looking thinking to "structure the future" is an important way to overcome cognitive dissonances. The extant literature in prospective sense making has highlighted the use of material artifacts in addition to linguistic forms of communication as engines which fuel the cycle of sense making and sense giving and allow the transition from the individual to the group or company level (Stigliani and Ravasi, 2012). This leads us to the following proposition:

Proposition 2: The extent to which a firm is able to develop willingness to change, as a second step in the development of dynamic capabilities, will depend upon the extent to which the firm is able to overcome cognitive dissonance at different layers in the organization through prospective forms of collective sense making

2.4.3 Ability to Implement: Managing Competing Objectives

The previous paragraphs indicate that the change process of an organization does not represent a smooth transition from the existing resource configuration to the desired resource configuration due to cognitive dissonance. Rather, the new resource configuration tends to be built on top of the older one until its underlying business model can prove its validity. Once the new business model is validated in the market, the higher levels in the hierarchy can use the generic KPIs (such as cash flow, revenues, margins) they are familiar with to evaluate the new business model.

The implications of this process for the management of resources in the transition from one business model to an alternative business model are important. In the case of WE❤MOBILE this meant that the company had to develop an entirely new concept based on online marketing, in parallel to the account management business model. Since the existing business model remained unchanged, the objectives in that model had to be reported at every board meeting, and the lower levels in the company had to accomplish these objectives in addition to thinking about the new business model. In other words, at each level in the hierarchy, the original objectives for the employees stayed the same. For instance, the technology roadmap and the engineering roadmap which had been agreed upon with the investors staid largely unaffected, and were reported at every board meeting. The partnership model continued to play a significant part in the board meetings, and OSMOBI was seen as an addition to that model.

The management of the OSMOBI process as a parallel path involved a combination of stretching existing resources to work for the OSMOBI project on top of the original tasks, and the acquisition of new resources. For instance, an internal communication document was sent in December (just after the OSMOBI website went on-line) with the following

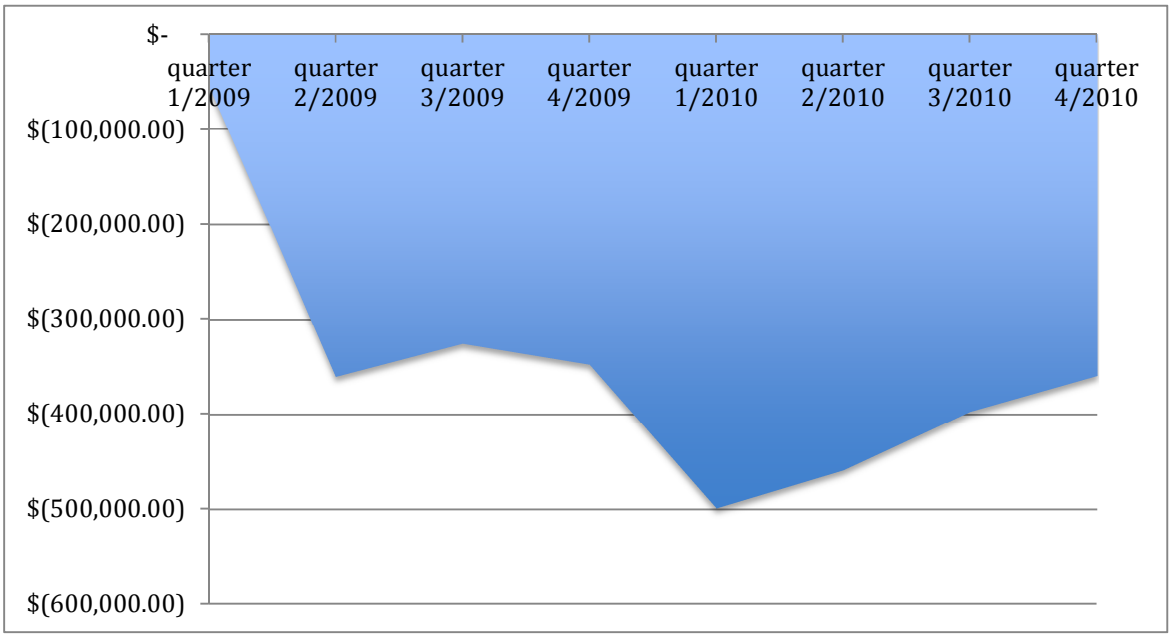
guidelines for the WE❤MOBILE employees: social media are an important marketing instrument for OSMOBI.

> *"…. I expect all engineers to be active on the various blogging forums. We use Netvibes and Google Alerts to be alerted when web developers blog about our service or the one of our competitors so we can follow this up very closely. In addition, I expect that everyone to send at least one twitter message a day to promote the product. Of course this does not mean that you have to neglect your day-to-day work….."* (CEO WE❤MOBILE e-mail 8 December 2009)

A new VP sales and marketing was attracted in January 2010, as well as a dedicated user-centric designer to build the graphical user interface for OSMOBI. The company also looked for an expert in online marketing to promote the product.

In the end, the company did not succeed in its goal because one of the VCs withdrew support, which caused a snowball effect on the two other investors. The company did not succeed in securing the funds needed to support the two business models (as new resources were acquired without divesting existing ones). The extra cost of the new business model is illustrated in Figure 8, which shows the numbers compiled by us from the business plan submitted to the venture capital syndicate, also used as a financial management tool in the BOD meetings of 2009, and the new business plan submitted to the investors in November 2009. The new business plan also includes OSMOBI. It shows that the development of OSMOBI would increase the burn rate significantly in 2010, peaking at 500 thousand dollars per month. This increase in burn rate resulted from the decision not to divest any of the existing resources. Instead, the management forecast that the development of OSMOBI and associated products would need an extra investment of 2 million Euros (BOD Report, February 22, 2010).

FIGURE 8: Forecast Cash Flow, 2009-2010



Source : Business plan November 2008, business plan November 2009

This change process deviates substantially from processes which have been described in the resource-constrained literature as "bricolage" (Baker and Nelson, 2005) or "effectuation" (Sarasvathy, 2001). This literature suggests that entrepreneurs change their business model very easily when new opportunities emerge. They address these opportunities by using existing resources, even if doing so requires some form of bricolage. However, this resource constraint literature has almost exclusively focused on very small ventures (Baker and Nelson included 29 ventures with a median number of employees of 4 in their investigation), without any form of venture capital (which means there was not necessarily an agreed upon business model) and predominantly in low-tech (i.e. less dynamic) environments. In contrast to the ventures described by Sarasvathy (2001) or the ones included in the Baker and Nelson (2005) study on bricolage, WE❤MOBILE had raised a substantial amount of A-round venture capital based upon a clear business plan upon which the milestones in the shareholders' agreement were based. These milestones are not always generic in the sense that they can be transferred from one business model to another (e.g. revenues). Instead, a part of them are quite business model specific (e.g. number of licenses sold, number of partnership agreements).

The process described above shows that the development of a new business model and resource configuration occurs in parallel to the ongoing implementation of the existing ones, and therefore requires the company to be able to manage conflicting objectives. The management of conflicting objectives has traditionally been covered by the literature on organizational ambidexterity (O'Reilly and Tushman, 2008). One solution proposed by that literature is the creation of dual structures to deal with different objectives in an organization, so-called "structural ambidexterity". Although WE❤MOBILE did attract some new resources to develop OSMOBI, no separate structure was created to champion the new business model. This solution would have been very difficult in such a resource constraint environment. A dual structure would have been considered as consuming too many resources and divert attention away from the core focus of the company.

Instead, competing objectives were managed at an individual level. The same people had to both implement the old business model and take actions to support the new one, although it is true that some remained to have a core focus on the old one (eg. AM2) while others had a core focus on the new one (eg. AM1). Gibson and Birkinshaw (2004) have introduced the concept of "contextual ambidexterity" to separate this way of managing ambidexterity from the structural ambidexterity mentioned above. When organizations manage contextual ambidexterity, it means that their organizational members are expected to cope with the contradicting requirements of the existing and new business models by smoothly switching between them in the course of their daily activities. Gibson and Birkinshaw (2004) assume that contextual ambidexterity is rooted in the individual's ability to both exploit the existing business model and to explore the new one, and advocate that a "context" needs to be created which enables this (Raisch, Birkinshaw, Probat and Tushman, 2009). Schreyög and Sydow (2010) have criticized this approach by challenging the assumption that individuals are cognitively able to switch in this way. They advocate a systems view which encourages both stabilization and renewal as two interrelated processes. Hence, a more important role is attributed to organizational processes and semi-structures to realize these competing objectives.

Eisenhardt, Furr and Bingham (2010) integrate these two views and propose management mechanisms to deal with conflicting objectives such as the use of heuristics to shape

strategic decision making and the use of flexibility-injecting structures to underscore decisions. In line with this, Farjoun (2010) suggests that flexibility and efficiency should not be seen as dualisms or competing objectives but are dualities that are interrelated to each other and should be managed accordingly. He suggests that companies should build in redundancy in their systems to allow experimentation with new business models, while avoiding that the old one collapses in the meanwhile. We observed that WE❤MOBILE has indeed used a mixed approach of both relying on and creating a context which stimulated ambidexterity of the individuals and developing a system which both encouraged stabilization and renewal. For instance, WE❤MOBILE relied on and stimulated the individual ambidexterity of the engineers to both develop further the old platform, but also engage themselves in online marketing activities such as blogging, twitting and tweeting about the new one. However, at the same time, it built in some redundancy and cognitive variety in the system to avoid that company completely collapses. As an example of system redundancy, AM2 took over some accounts of AM1 so that he could spend more time on the development of OSMOBI. Cognitive variety was built into the system for instance by recruiting two account managers, one of them had a lot of industry and job specific experience, while the other one had an extensive amount of general experience. Eventually, AM1, who had extensive general experience, played a crucial role in developing the OSMOBI product. In addition management mechanisms such as the creation of a virtual OSMOBI tiger team (which was an example of a flexibility injecting mechanism because it cuts across the structures and simplified much of the decision making as the CEO and CTO were immediately informed) and the use of heuristics from a different industry such as number of downloads and users.

Taken together, the literature on competing objectives proposes both contextual, system level and managerial practices to induce the simultaneous pursuit of such competing objectives (for an overview see table 3). The point of departure of these solutions is that flexibility and efficiency should be seen as dualities rather than dualisms (Farjoun, 2010). This means that the company should attract individuals who are able to cope with individual ambidexterity and create a context to promote this form of individual level ambidexterity. However, this is not sufficient. The organizational system should also have

built in mechanisms to deal with stability and change. This can be realized by bringing redundancy and cognitive variety into the system. In addition, managerial practices such as flexibility inducing mechanisms and the use of simplifying heuristics can further increase the effectivity of managing efficiency and flexibility as a duality. This leads us to the following proposition:

Proposition 3: The extent to which a firm is able to implement change, as a third step in the development of dynamic capabilities, will depend upon the extent to which the firm is able to manage competing objectives at different layers in the organization through managing efficiency and flexibility as a duality

2.5 Discussion and conclusion

The purpose of this study was to gain a better understanding of the micro-foundations of dynamic capabilities. We performed a case study of a new venture, WE❤MOBILE, which was confronted with a radical environmental shift which forced the firm to change its business model and associated resource configuration. To do so, it had to build dynamic capabilities at firm level.

Our study puts forward three important contributions to the dynamic capability literature. First, we introduce the attention-based view of the firm as an underlying theoretical perspective to position the different hierarchical layers and their focus of attention in the firm in the perception stage of dynamic capability development. This study provides a rich understanding of how attention differs across hierarchical layers in the organization and how the organization needs to develop procedures and communication channels to manage this distributed attention. Focusing on top-level decision makers is not enough when organizations have to change because of external pressure. Addressing the challenges suggested by the attention-based view (see table 3) is a crucial element in the successful inception of dynamic capabilities. We refer to the insights offered by the theory on issue selling to address these. Second, this study introduces cognitive dissonance as a main theoretical explanation for the reluctance of individuals to introduce change even if they are convinced that change is necessary. Cognitive dissonance at the different levels of the organization's hierarchy explains why firms might be less "willing" to change than

originally expected. We show in detail how cognitive dissonance causes resistance to new environmental demands and how elements of collective sense making can be used to overcome this resistance. Third, we show how the literature on competing objectives provides guidance in how firms can manage efficiency and flexibility as a duality. We hypothesize that shaping a context for individual ambidexterity and developing a system to manage this duality are necessary components on which additional management practices such as flexibility inducing mechanisms can be added. In sum, the development of dynamic capabilities implies (a) the management of distributed attention through a process of issue selling, (b) the management of cognitive dissonance through a process of prospective collective sense making, and (c) the management of competing objectives through a process of duality. The next paragraphs elaborate on the implications of each of the three contributions.

Understanding the management of distributed attention in the "perception" stage of dynamic capability development is a key ingredient for advancing the theory of dynamic capabilities. Attention is distributed across hierarchical levels in the organization (Ocasio, 1997) and both the level and the focus of attention differs at these various hierarchical levels. Hence, the level at which the environmental change is detected and where most likely the answer to that change will be formulated, will have to communicate clearly with the other levels in the organization. To facilitate that distribution of attention, organizational procedures such as regularly organized meetings between different levels of the organization, activities such as presentations for stakeholder organizations, and communication in the form of public press coverage to alert more distant stakeholders is needed. A crucial characteristic of the distribution channels is that efficient vertical interactions complement horizontal interactions to convey new information and focus attention (Joseph and Ocasio, 2011). If attention is not carefully managed, the weakest link in this distribution channel will eventually determine whether or not a dynamic capability will be developed. In the WE❤MOBILE case, it was ultimately the third (public) investor's investment team, with which no form of interaction was possible through a vertical distribution channel, which pulled the plug. This means that managing attention implies that the same focus of attention has to be spread throughout all levels. Our study shows that

tightening vertical interactions is necessary to shift the cognition of decision makers who face cognitive inertia when being confronted with an environmental shock. Their greater distance from the firm's action hinders the interpretation of new information and action-outcome relationships (Gavetti, 2005).

The attention-based view of the firm does clearly highlight the sources of why the same opportunities or threats are not considered to be equally important in different parts of the organization. The solution to this however is to be found in a different part of the literature which addresses attention, namely the literature on issue selling. We show that the "objectivisation" of data through the use of testimonials and external exports, the "change in modes of communication" by increasing direct involvement of the actors in different committees and the "communication persistency" by continuously putting important issues on the agenda, helps to create awareness among decision makers.

We have shown in the WE❤MOBILE case that, although different hierarchical layers in the organization were recognizing the change in the environment and were willing to develop an answer (OSMOBI) to address it, this did not mean that they were willing to change the business model at company level nor to change the associated resource configuration. In fact, we found that those decision makers who had strong cognitive maps related to the existing business model and resource configuration were the least willing to change. They faced significant challenges to interpret the environmental change and its implications for the organization. Instead, they used their cognitive maps to fine-tune the existing business model, with which they felt comfortable. Thus, the impact was a further enhancement of current capabilities instead of the development of dynamic capabilities, which would allow the organization to make the transition to the new business model and resource configuration. We explained this process theoretically by employing the theory of cognitive dissonance. This theory, developed by Festinger (1957) is widely adopted in the individual and social psychology and the marketing literature. It explains why people resist change and how they do so. Since organizations which have to reconfigure their resources require dynamic capabilities (Zahra et al., 2006), developing such capabilities implies that cognitive dissonance must be managed. One mechanism to manage cognitive dissonance is to recruit people with less experience. For instance, we show that the account manager without

experience recognized the change in the environment and was willing to develop a novel response, while the experienced account manager kept using and re-using his/her cognitive maps to improve sales. This finding suggests that prior experience with a specific type of business model is an important boundary condition to the fungibility of human resources in highly dynamic markets, where business models may change dramatically in a short period of time.

Managing cognitive dissonance implies that mechanisms of collective sense making are needed to overcome individual dissonances. Material artifacts are one such form of mechanism. The literature on prospective collective decision making has shown that the use of prototypes and other visual artifacts facilitates both sense giving from one individual to another and a generic collective form of sense making along which a group of individuals draws the same conclusions based upon a more collective form of discussion. In addition to material artifacts, the development of generic KPIs (key performance indicators) for the new business model can be seen as an additional way to stimulate collective sense making at the higher levels of the organization. Finally, the use of a benchmark company which had already developed a similar business idea did increase the willingness to further explore this avenue among the key decision makers.

This brings us to our third theoretical contribution to the dynamic capability perspective. Realizing change implies that not only perception and willingness are created, but also that the individual decision makers must be able to implement the change deemed appropriate. We show that instead of moving from one configuration to another, the new business model and resource configuration are developed in parallel to the existing one, due to cognitive dissonance. Individuals will try to marginalize the dissonant cognition and leave the development of the new business model to individuals with less dissonant cognitions. However, this form of experimentation with a new business model implies that a significant number of employees at WE❤MOBILE had to be able to pursue competing objectives due to limited resources. The degree to which they were able to do so also determined the ability with which WE❤MOBILE was able to go through the final stage of the dynamic capability process, namely its implementation.

In line with recent thinking in this theory, we argue that the management of competing objectives is an important element of this implementation process. Competing objectives can be both managed at individual and at system level. We show that at WE❤MOBILE managers did create a context, which encouraged individual ambidexterity. Of course, in line with the theory, this required a lot from the individuals in terms of cognitive ability. However, in addition to creating the context to deal with such ambidexterity, the company also developed a system which allowed to pursue both flexibility and efficiency at the same time. For instance, cognitive variation was built into the system so that new ideas could be developed. The case study shows that AM1 used the heuristics he had learned during his MBA classes and at his previous job to make sense of the changed environment and to develop a solution. Also redundancy was built into the system so that the organization did not immediately collapse when more time was allocated to explore the new business model. Finally, the organization also introduced management mechanisms, which are known to increase flexibility. For instance, prototyping rather than planning was used as a way to communicate the new business model and gradually convince different layers in the decision-making structure. Also, the new business model was directly communicated to the investment committees, which is a form of simplifying the decision-making structure. In fact, WE❤MOBILE's inability to simplify this line of communication with one of its investors also led to its ultimate failure.

In sum, we conclude that we have extended the dynamic capability view by considering different decision makers working in different hierarchical layers, as their attention is situational and needs to be managed. In addition, their willingness to develop changes will depend on how individual cognitive dissonances are overcome and, finally, eventual success in implementing these changes will depend on the extent to which the organization can manage competing objectives. We present each of these underlying theories as "challenges" for which responses can be found in derivative streams of the literature such as issue selling, collective sense making and the management of dualities.

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APPENDIX A: Email AM1 to CEO/CSO

From: AM1
To: CEO
Sales & Marketing Director (CSO)
Date: 6/03/2009 17:37:11
Subject: The clone of WE♥MOBILE - www.mobi.me

GUI, GUI, GUI!!!!!

Yet, this is a clear example of how a proper GUI can make your product look better.

Not sure where mine and Jan's GUI specs ended ... but it looks like Mobi got it in their hands and implement (some) of our ideas!... From a commercial viewpoint, 100% their GUI gives them a more 'sellable' product. Try it yourself. It takes NO training or user manual. It is simply logical.
1) enter the desktop website where the content is (what a pity you can select only one website and not many....
2) by just clicking pictures/texts on it, select the web content you want to mobilize
3) look how it looks on a mobile device. Add, move it, insert something by just clicking some buttons. DONE!!!!!!!!!!!!!!!!!!!
No need to know about filter/mapping... no need to read manuals. No training.

ENGINE

Like ours, based on Xpath expression concept. Their 'composer' is web-based, like ours. But sometimes it crashes (like ours?:-)), not very stable.

MARKETING

It makes you think how cool the name 'Mobi' is. Maybe 'composer' is not so appealing for marketers?
I personally don't like their website but I like the fact that it is simple and stupid.

Business Development

Business Model is based on licenses and the service is fully hosted.
Target groups: web developers.
Nice to see that their 'license page' on their website does exactly what we want to do in our new one (including Terms & Conditions). The new website
developers in WE♥MOBILE should copy it!.
Pricing: VERY LOW. But also the allowed traffic is low.... as far as I can understand. "CEO", can you help here?

Best
AM1

3 Understanding the Micro-Foundations of Substantive and Dynamic Capabilities in New Ventures: The Role of Founder Personality

ABSTRACT

Many studies have documented outcomes of capabilities but the fundamental question of the origins of capabilities remains largely unknown. Consistent with the upper echelons literature and using a micro-foundation approach, our study provides compelling evidence that personal characteristics of the early top managers (firm founders) predict capability development. Using a methodology combining two years of exploratory qualitative research and a survey of 144 founders, we found that founder personality predicted development of dynamic and substantive capabilities. Extending research on top management team diversity, which tends to study either the average or diversity levels of team characteristics, we showed that the configuration of these personality characteristics predicts capability formation. Our study is also one of the first to develop scales to measure substantive and dynamic capabilities.

KEY WORDS: dynamic capabilities; new ventures; personality; micro-foundations

Understanding the Micro-Foundations of Substantive and Dynamic Capabilities in New Ventures: The Role of Founder Personality

3.1 Introduction

During the past decade, the extant capability literature has mainly focused on understanding how a firm can sustain competitive advantage by responding to and even proactively pursuing environmental change. This capacity of a firm to change has been defined as its "dynamic capability" (Teece, 2007; Helfat and Peteraf, 2009; Helfat and Winter, 2011). However, even after a decade, the literature still falls short of disentangling dynamic from substantive (or ordinary) firm capabilities (Helfat and Peteraf, 2003; Danneels, 2008; Barreto, 2010; Helfat and Winter, 2011). Most dynamic capability research has tried to refine the definition of dynamic capabilities and has focused on the question of the environmental circumstances in which dynamic capabilities lead to competitive advantage (Helfat and Peteraf, 2003; Teece, 2007; Zott, 2003; Barreto, 2010; Helfat and Winter, 2011).

Not only does the extant literature fail to disentangle dynamic from substantive capabilities, the literature also remains largely silent when it comes to explaining how these capabilities emerge (Autio, George, and Alexy, 2011). More research is thus needed to understand the antecedents of capability formation. According to the upper echelons literature, the firm reflects the preferences of its top management team (Hambrick and Mason, 1984). Firm actions, strategy, decisions, and structures do not emerge "from a disembodied decision making process—managers make these decisions." Yet, this upper echelons perspective is notably missing from the literature on capability formation. Echoing this omission, Felin and Foss (2011) call for a micro-foundation perspective on capability formation, i.e. a focus at the individual level to understand the origins of capability formation (Felin and Foss, 2005). This call is further endorsed by several researchers including Eisenhardt and Martin (2000) and Helfat and Peteraf (2003) who argue that individual-level attributes are important in the early stages of capability development. Gavetti (2005) further extends this view by showing that the situational attention of individuals based upon their position in

the organizational hierarchy impacts the development of capabilities. Of all individual attributes, personality is most fundamental as it shapes behavioral tendencies and decision making (Zhao and Seibert, 2006). Individuals are confronted with so many stimuli, laden with so much ambiguity, complexity, and contradiction, that their personalities greatly enter into how they distill and process this information (Nadkarni & Herremann, 2010). This filtering process influences their strategic choices and is considered to be central to developing strategic flexibility (Johnson et al., 2003; Shimizu & Hitt, 2004).

In this paper, we address two research gaps by testing (a) how individual level attributes, specifically personality traits of members of the founding team, influence (b) the development of either substantive or dynamic capabilities (separately) in new ventures. Since the micro-foundations of capability formation are an emerging area of research, we added a qualitative investigation to complement our deductive study. We complement our theorizing with interview evidence which informs us about different personality types and the decisions early stage entrepreneurs make. In line with Kim and Miner (2007), we use insights from these interviews to formulate our hypotheses. However, it is important to note that this is not an inductive study. The qualitative evidence is not used to build theories but to enrich our empirical model.

As substantive and dynamic capabilities are developed early in the firm's existence (Zahra et al., 2006), we studied firm founders. Our findings support that individual attributes measured by the personality differences between founders play a role in explaining the origins of capabilities and therefore develops a rationalist foundation of capability development beyond the endogeneity problem as raised by Foss and Felin (2011). More specifically, we show that conscientious founders, who are hardworking, achievement-oriented, like to plan and are well-organized (Gellatly, 1996; Bell, 2007; Ciavarella et al., 2004; Barrick and Mount, 1991), prioritize the development of substantive capabilities. In comparison, proactive founders, who like to take initiative to improve current circumstances or create new ones (Crant, 2000; Grant and Ashford, 2008), contribute to the development of dynamic capabilities. We further show that if one founder is highly proactive, but lacks conscientiousness, this can be compensated by a higher degree of conscientiousness by another founder within the founding team. This study contributes to

the theory of capability development by showing how personality traits of individuals contribute to our insights about the origins of de novo capability development and how different personalities at the individual and team level prioritize development of different capabilities, even in the same environment.

3.2 Capabilities and personality traits

The extant capability literature describes two types of capabilities. Winter (2003) defines zero-level or ordinary capabilities as those that earn income now, while dynamic capabilities are those that create, modify and extend ordinary capabilities. This two-level dichotomy is broadly based and also known as operating routines vs. dynamic capabilities (Zollo and Winter, 2002), operational vs. dynamic capabilities (Helfat and Peteraf, 2003), zero-level or ordinary capabilities vs. dynamic capabilities (Winter, 2003), substantive vs. dynamic capabilities (Zahra et al., 2006; Helfat and Winter, 2011) and lower- vs. higher-order competences (Danneels, 2002; Danneels, 2008). Although most papers use slightly different definitions of both substantive and dynamic capabilities, more recent work suggests that capabilities are 'capacities' (rather than routines), with substantive capabilities referring to the capacity to perform a particular activity in a reliable and at least minimally satisfactory way (Helfat and Winter, 2011:1244) and dynamic capabilities as the capacity to change the firm's resource base, its operational capabilities or its environment (Teece, 2007; Helfat et al., 2007; Helfat and Winter, 2011).

Whereas Teece, Pisano and Shuen (1997) refer to dynamic environments as a primary reason for dynamic capabilities to emerge, Eisenhardt and Martin (2000) show that dynamic capabilities also have advantages in moderately dynamic environments, and Helfat and Winter (2011) even provide anecdotal evidence that dynamic capabilities can lead to competitive advantage even in relatively stable environments. Zahra et al. (2006) argue that substantive and dynamic capabilities interact with each other and even reinforce their impact in a given environment. Despite these findings, much of the debate has been about trying to distinguish dynamic capabilities from substantive ones (Helfat and Peteraf, 2009; Di Stefano, Peteraf, and Verona, 2010; Helfat and Winter, 2011).

The extant literature on capabilities uses empiricism and behavioral theory to explain how capabilities develop (Felin and Foss, 2011). Empiricism suggests that the development of capabilities is determined by the perception of needs in the environment. Behavioral theory assumes that firms develop routines based upon previous experiences. Experience and the perception of the external environment are thus key determinants in explaining how capabilities develop. For example, Zahra et al. (2006), Zollo and Winter (2002), Eisenhardt and Martin (2000) and Gavetti and Levinthal (2000) each refer to organizational experience based on different forms of learning models to explain the development of capabilities in companies.

Whereas experience is instrumental for explaining the level of capability development, without making a distinction between dynamic and substantive capabilities, environmental factors such as 'dynamism', 'volatility' or 'change' are used as explanatory factors to distinguish between the need for dynamic versus operational capabilities (Teece et al., 1997). As aforementioned, Eisenhardt and Martin (2000) already show that in volatile environments, dynamic capabilities can be important, while Helfat and Winter (2011) even argue their importance in stable environments. Zahra et al. (2006) then argue that even in dynamic environments, substantive capabilities are important. One of the reasons the environment is not a good predictor of different forms of capability formation is that the perception of the opportunities or threats in this environment will be determined by the individual traits of the managers who make sense of this environment, i.e. the micro foundations of the firm (Teece, 2007).

Foss and Felin (2011) further question the use of empiricism and behavioral theory by arguing that the above explanations of capability formation tend to be endogenous. Presenting capabilities as routines developed over time through accumulated experience implies that there will be feedback loops between the dependent variable (capabilities) and the independent ones (e.g. cumulated experience), which result from an inherently endogenous situation. In other words, the literature falls short of explaining how capabilities emerge and what determines their difference. To trace the emergence of capability formation, one needs to track the early stages of a firm, because it is during this phase that capabilities are developed. As Autio et al. (2011) highlighted, in a firm's early

stages no routines have been accumulated over time, and more focus is needed on de novo capability development. In order to analyze which capabilities managers are likely to develop from scratch in firms, Teece (2007) already highlighted that the micro-foundation view on capabilities is an interesting avenue for research.

The micro-foundations include the distinct individual characteristics which influence the decision making behavior of managers (Felin and Foss, 2005). This perspective echoes the upper echelons stream of research where the firm reflects preferences of the top management team (Hambrick and Mason, 1984). The early members of the top management team (firm founders in this study) bring in human capital in the form of firm-specific, industry-specific, related industry, and generic skills which influence firm outcomes (Castanias and Helfat, 1991, 2001). This micro-foundation of dynamic capabilities reflects the broader perspective that in order to understand firm strategy, structures, and goals, the characteristics of key managers should be studied. As Adner and Helfat (2003) asserted an inquiry into corporate strategy extends to the individuals responsible for strategic decision making. An answer to the question of 'what makes firms different' requires an answer to the question of 'what makes managers different.' Among upper echelons characteristics, personality and cognitions are two main human capital factors which determine the decision making behavior of managers. Scholars in the cognition perspective assume that entrepreneurs make decisions either based upon heuristics they have learned in the past or upon simplifications of the environment (Baron, 2004; Gavetti, 2005). Gavetti (2005) shows that managerial cognition helps predict how capabilities develop. Autio et al. (2011) show in a qualitative study how entrepreneurs' cognition impacts the way they perceive environmental opportunities to internationalize and modifies their approach to internationalization. Despite the contributions of the cognitive approach, Hodgkinson and Healy (2011) call for a less cognitive approach to the micro-foundations view. Personality traits offer an alternative as they impact the focus of attention of managers (Ocasio, 1997). Ocasio (1997) shows that what decision makers do will depend on where they focus their attention, which is in turn determined by their personality characteristics. Focused attention explains the mechanism through which personality traits might lead to decisions which impact the development of capabilities.

Generic human capital factors, such as personality, should predict firm outcomes across a wide range of industries (cf. Adner and Helfat, 2003).

For years, entrepreneurship research has explored the implications of the personality of founders and early top managers. The majority of work has focused on either what personality traits affect an individual's likelihood of becoming an entrepreneur, or the differences between entrepreneurs and managers. Far fewer studies have explored which personality types of founders are prone to successfully guide their ventures to long-term survival (Ciavarella et al., 2004). When reviewing these studies, proactiveness and conscientiousness are the personality constructs most strongly and consistently associated with successful entrepreneurs (Zhao, Seibert, and Lumpkin, 2009). Whereas proactiveness tends to be positively associated with opportunity detection (Ardichvili, Cardozo, and Ray, 2003; Baron, 2007), conscientiousness is shown to have a positive impact on the outcome of the entrepreneurial process (Zhao and Seibert, 2006; Zhao et al., 2009) and seems to influence the founder's likelihood of taking the venture from the startup stage to the maturity stage (Ciavarella et al., 2004). Conscientious individuals are described as hardworking, achievement-oriented, forward-planning and well-organized individuals (Gellatly, 1996; Bell, 2007; Barrick and Mount, 1991). Most personality scholars distinguish two dimensions within the conscientiousness trait (Collins, Hanges, and Locke, 2004): need for achievement and dependability. The need for achievement facet of conscientiousness reflects the preference for situations in which performance is directly related to one's own efforts rather than to other factors. The dependability facet of conscientiousness refers to the extent to which one is organized, deliberate and methodical and can be relied on to fulfill one's duties and responsibilities. Although, both facets are distinct characteristics of conscientious individuals, the conscientiousness construct is seldom analyzed in its subcomponents. There seems to be consensus that both elements are important, but interrelated and not exhaustive to cover conscientiousness, which also includes perseverance as a characteristic (Zhao and Seibert, 2006; Zhao et al., 2009).

Proactiveness is a personality trait which describes someone who is intellectually curious, imaginative, and creative; someone who seeks out new ideas (Griffin, Neal, and Parker, 2007). Bateman and Crant (1993: 105) defined a proactive person as someone with a

relatively stable behavioral tendency to initiate change in the environment. Proactive individuals identify opportunities, act on them, show initiative and persevere until they bring about meaningful change (Crant, 1996; Crant, 2000). A proactive person anticipates, plans for, and attempts to create a future outcome that has an impact on the self or environment (Grant and Ashford, 2008). Proactivity which is a facet of openness to experience has been used to explain differences in entrepreneurial opportunity recognition (Ardichvili, Cardozo, and Ray, 2003), ability to find new solutions (Unsworth, 2001), entrepreneurial intent (Crant, 1996) and venture success (Ciavarella et al., 2004).

To conclude, founders of new ventures have a particularly high impact on the way in which the venture will be structured. Above, we suggested that the personalities of these founders might lead to different forms of decision making behavior. More specifically, we suggested that two different personality traits have been found to be specifically relevant among founders and managers: conscientiousness and proactiveness. Below, we develop the hypotheses of how these factors predict different forms of capability development.

3.3 Personalities as micro-foundations of capability formation

The personality trait of conscientiousness is defined by characteristics such as orderliness, persistence, achievement goal orientation, hard work, and reliability (Costa and McCrae, 1992; Gellatly, 1996). As aforementioned, the extant literature on personality has put conscientiousness forward as a good indicator of managerial success. Managers scoring high on this characteristic tend to structure and organize their environments better. Conforming to these characteristics, Sine, Mitsuhashi, and Kirsch (2006) show that imposing structure and effectively managing time are critical to successfully commercialize a business idea. Conscientious managers, who are structured, well-organized and possess planning skills (Mount, Barrick, and Strauss, 1999), should be better at developing an efficient business model. Substantive capabilities do not arise automatically. Instead, they involve intense, effortful, prolonged and highly-focused efforts (Baron and Henry, 2010). Because persistent efforts are needed to develop substantive capabilities, conscientious founders are likely to build these capabilities because conscientious individuals pay attention to and are better at creating structures for the company (Mount et al., 1999). One

of the highly conscientious founders whom we interviewed in our study (average of 6.53 on 7-point scales; above the 90th percentile) provided supporting evidence for this. He stated:

> *"I joined my two co-founders when they were about 12 months into the project. My first job was cleaning the mess they had created in 12 months' time. There was nothing here: no meeting reports, no HR policy, no product roadmap, no sales plan… It was a real mess. It was only after I had joined that we really started the company and that we could convince investors…"*

In line with the quote above, we expect that the level of conscientiousness will explain the development of substantive capabilities. Founders who are highly conscientious are likely to be effective in setting up structures within the venture and are motivated to achieve their objectives, even if this means they have to fight against resistance. In other words, we assume that conscientious founders will implement routines in their ventures to reflect their personal preferences.

In contrast, the inclusion of conscientious founders should be associated with a greater tendency to stay committed to task accomplishment and avoid digressions and other impulses to stray off task (Barry and Stewart, 1997). These focused and structured individuals can have difficulties thinking out of the box and considering information which is not directly relevant to execute existing tasks. As such, conscientiousness can curtail creative problem-solving (Waldman, Atwater, and Davidson, 2004; Hough, 2003) and subsequently impede development of the firm's capacity to identify new opportunities and address changing environments. Moreover, individuals high on conscientiousness tend to have a high need for order and avoid doing things without careful consideration (LePine, 2003). In fast moving environments, conscientious founders can have difficulties making changes in a timely manner. Following this logic highly conscientious managers are less likely to foster development of dynamic capabilities. One of our interviewees, a highly conscientious founder (average 6.84 on 7-point scales; above the 90th percentile) provides anecdotal evidence for this view when he commented that:

"I prefer to execute our business plan stepwise. After two years, we still have our initial business plan with only a few corrections. This systematic approach caused us some delays, but I'm convinced that this approach will be beneficial for our company in the long run. For the moment, we have developed our product in the greatest details and are looking forward to bringing the product to the market in the near future. We hope that the market will respond well."

Therefore:

H1a The higher the level of conscientiousness of the individual founder or the collective founding team, the more likely the venture will develop substantive capabilities.

H1b The level of conscientiousness of the founder(s) will not impact development of dynamic capabilities

Proactive behavior is defined as taking initiative to improve current circumstances or to create new ones (Crant, 2000). Proactive personalities actively seek information and opportunities to improve things. They don't passively wait for information or opportunities to come to them, and they are creative in finding alternative solutions (Crant, 2000). Unsworth (2001) defines proactive behavior as a form of creativity, a way to generate more ideas and an active search to solve problems. In a review of the concept, Parker, Williams, and Turner (2006: 636) suggested that 'despite different labels and theoretical underpinnings, concepts that relate to individual-level proactive behavior typically focus on self-initiated and future-oriented action that aims to change and improve the situation or oneself.' Proactive people, who develop proactive behavior in an organization, scan and identify opportunities and act on them, show initiative, and persevere until meaningful change occurs. However, people low on proactive personality should exhibit opposite patterns: they can fail to identify, let alone seize, opportunities to change things.

Dynamic capability is an organization's capacity to change its substantive capabilities. Dynamic capabilities imply an organizational capacity to sense and shape new opportunities and divert existing resources bundles and routines toward new directions. Zahra et al. (2006) summarize that in order to implement dynamic capabilities, an

organization must have the ability to perceive external opportunities, have the willingness to change its existing resource configuration and eventually implement these changes. This three-step cycle is also supported by other scholars in the dynamic capability perspective (Teece, 2007; Helfat and Winter, 2011). At the individual level, this implies that the key decision makers should have the skills to identify and/or co-create opportunities and take the initiative to convince others in the organization to implement them.

This is exactly what proactive behavior is supposed to be, and proactive personalities are hence more likely to establish that behavior in their ventures. Proactive individuals are path-finders who constantly look around and scan the company's environment (Bateman and Crant, 1993). They possess creative minds which allow them to think out of the box and find solutions or new directions (Unsworth, 2001). Along the same line as our reasoning, one of the proactive founders (average 6.50 on 7-point scales; above the 90th percentile) in our sample commented that:

> *"I'm a creative thinker and help to bring new opportunities into our company. I'm not interested in spending 99% of my time on HR issues or other day-to-day problems. I have the ideas and the vision of where the company needs to be within 5 years, but I do not have the patience to build up and manage the structures needed to pursue these new paths. I have set the goal for this company and convince others to follow."*

Another characteristic of a proactive personality is the ability to take initiative. Proactive persons do not hesitate to take action and persevere until they reach closure by bringing about change (Parker et al., 2010; Crant, 2000). One of the main components of this proactive behavior is therefore taking personal initiative since proactive individuals tend to take action to achieve their goals even in the face of barriers and setbacks (Griffin et al., 2007).

Finally, they should be more aware of the need for their ventures to change and update the business idea, not stick rigidly with the initial business plan. Grant and Ashford (2008) suggested that proactivity involves a process of anticipating, planning and striving to have an impact. Parker et al. (2010) further elaborated this by identifying proactivity as a goal-driven process involving both generating and implementing forward looking goals which

might involve a departure from the current situation. Based on these characteristics, proactive individuals are likely to question the routines which are used in day to day practice. By doing so, it is likely that they will also enforce this attitude in the venture they have created and develop a culture reflecting this attitude at an organizational rather than at the individual level. One of the more proactive founders (average 6.70 on 7-point scales); above the 90th percentile) of the companies we interviewed shared the following:

> *"The success of our company has been the fact that we were flexible enough to continuously change our business plan when we got more insights from the market. I always strived to deliver this message throughout the company by using metaphors. The employees, the financers and the other members of the management team always followed this and now it has become part of our culture…"*

In summary, proactive individuals tend to be opportunity focused, take personal initiatives to achieve their goals, and are change-oriented. Therefore:

H2a: The more proactive the individual founder or the collective founding team of a new venture, the more likely this venture will develop dynamic capabilities.

H2b: The level of proactivity of the founder(s) will not impact the development of its substantive capabilities

Hypotheses 1a and 2a predict a positive relation between the degree to which the personality trait is present in the founding team and the development of capabilities at organizational level. However, an average personality trait at team level does not reveal within team composition. In other words, a relatively high level of average proactivity at team level can either reflect a homogenous high degree of proactivity or an extreme proactive founder, complemented by less proactive persons in the founding team. The question which emerges is whether the way in which a team is composed affects the overall team performance and hence explain different forms of capability development at company level (Zhao and Seibert, 2006; Bell, 2007; Mathieu et al., 2008).

In the case of capability development at organizational level, we already hypothesized that specific personality variables lead to the development of specific capabilities, thus implying that personality variables contribute directly to the specific tasks under study, namely the development of different capabilities. Therefore, we can assume that heterogeneity in the personalities of the founding team resembles task-related diversity in the team, which in turn suggests a positive impact on task performance. In other words, the founding members with different personalities in the team are supposed to complement each other.

Along these lines, one of the more conscientious founders (average 6.82 on 7-point scales; above the 90th percentile) in our sample expressed the following opinion:

> *"I consider myself to be quite structured and tend to take a long time before making a choice. My co-founder tends to be more opportunity-driven. He is responsible for scouting technology opportunities and presenting them to the board to get funding. I could not do this, but I have introduced some stop procedures in the company which have saved us from losing quite a lot of money. Together we accomplish more than the sum of the two of us."*

From the point of perspective of the conscientious founder, the quote above clearly illustrates the importance of team composition. Conscientious founders are not against change, nor do they create barriers to it, it is just not on the top of their mind. However, they appreciate their co-founder fulfilling that specific role. Also the more proactive founders appreciate the conscientious personality type in the founding team. One of the more proactive individuals (average 6.50 on 7-point scales; above the 90th percentile) shared the following:

> *"My co-founder (who scores high on the conscientiousness scale) owns all the credit for the strong financial position which our company has. If he was not there, I would have taken decisions more intuitively and would have lost focus. I have a tendency to jump into new opportunities without being fully aware of the financial risks associated. But thanks to me, we are doing what we do today as a company."*

This shows that proactive personalities do not necessarily create barriers to substantive capability development, but they do not actively think about them. However, they appreciate their co-founder with a conscientious personality filling this gap. This leads us to the following hypotheses:

H3a: Having a proactive founder in a team with a relatively high degree of conscientiousness will strengthen the relationship between team conscientiousness and development of dynamic capabilities

H3b: Having a conscientious founder in a team with a relatively high degree of proactivity will strengthen the relationship between team proactiveness and development of substantive capabilities

3.4 Research setting

We analyze a population of new technology-based firms located in Belgium to explore our research questions. We define new technology-based firms as start-ups that are established to exploit a new technology through developing either services or products based on this new technology (Little, 1977; Autio, 1997; Clarysse, Bruneel and Wright, 2011). This population is particularly interesting for exploring the development of capabilities, as these companies (a) operate in extremely volatile environments characterized by emerging market demands and/or emerging technical developments (Eisenhardt, 1989; Eisenhardt and Schoonhoven, 1990; Clarysse et al., 2011); (b) tend to be growth-oriented and thus make rapid transitions from a loosely structured organization towards a more professional organizational structure, where capabilities tend to prevail over individual entrepreneurial characteristics (Kazanjian, 1988; Almus and Nerlinger, 1999; Brinckmann and Hoegl, 2011), and (c) allow us to distinguish between individual-level attributes and organizational characteristics, to differentiate founder characteristics from organizational routines which are developed (Sine et al., 2006).

Besides the theoretical advantages, there are also a number of practical advantages in choosing this population. First, these companies tend to be easy to identify as they are eligible for a variety of innovation grants, for which they tend to bid repeatedly. Secondly, they tend to collaborate in longitudinal research, as they see this collaboration as a giving

back to the public institutes which administer such grants. Some 144 founders of 78 new technology-based firms collaborated with us over a three-year period, from 2009 to 2011. More details on how the data were collected are given in the next section.

3.5 Methods

3.5.1 Qualitative Study

Our study combines exploratory qualitative work with quantitative hypothesis testing to establish a link between our theories and our statistical models. Our formal hypotheses test causal predictions about how individual and team antecedents lead to the development of firm capabilities. This qualitative data, grounded in field observation, is not used to build theories around a specific situation, but to inform empirical models that reflect our theories (Kim and Miner, 2007). Using only quantitative data to support hypotheses on capability development leaves us with gaps in the proposed theories because the data do not address how capabilities develop (McKelvie and Davidsson, 2009). Our quantitative study contains two important parts. First, we performed in-depth analysis of a new technology-based venture, using participant observation as a data collection technique to construct an instrument to measure substantive and dynamic capabilities. During the first years after start-up (2007-2009), we were able to attend the weekly management meeting of this venture, the monthly board meeting and the biweekly communication forum for the employees. This in-depth information allowed us to construct an instrument to measure substantive and dynamic capabilities. We used this instrument in the quantitative part of the research.

Second, to fill potential gaps between our theories and our empirical models, we informed and challenged our theorizing via continuous, iterative, qualitative investigations once the quantitative, longitudinal research design (2009 - 2011) had started. In the first interview round, we visited 167 founders of 93 new technology-based ventures who had founded their venture within the two years preceding data collection in 2009. We did face-to-face interviews which were extremely helpful to explain the upcoming longitudinal, quantitative research design. Interview duration varied from 30 minutes to two hours. The interviews

also allowed us to build trust and rapport with the founders to increase cooperation and response rate during the quantitative, longitudinal data collection process.

3.5.2 Sample

We started with a list of 131 new technology-based companies. After checking the founding years from the BELFIRST database, we chose to eliminate companies older than 3 years at the time of the first interview round (2009). We made this choice to capture the development process of capabilities in the early stages of a new venture, an approach which is consistent with the operationalization of new ventures (Zahra, Hitt, and Ireland, 2000). We developed a longitudinal quantitative research design supported by a continuous qualitative study and secondary data collection. In all, we contacted 116 companies. Of these, 6 new ventures had ceased to exist by the time we sought to contact them, because they had been acquired or dissolved. Eventually, we collected data about the experience and personality styles of 167 founders of 93 new ventures (response rate 80%) in the first interview round. This baseline information was collected at an individual level by using a structured questionnaire during face-to-face interviews. We added founder and company data on each of the ventures, which we collected from IWT1, the innovation granting institute which supported this research. Thus, we used several information sources to collect data on the founders and their companies. In the end, we followed 144 founders of 78 new ventures (response rate of 67%) through the first interview round (2009) and the two follow-up rounds (2010 and 2011). Eleven companies did not respond in the follow-up rounds because they were acquired or dissolved. In these follow-up rounds, we collected information about the capabilities the companies had developed after start-up. Here, we used a web-based survey supported by telephone follow-ups to collect capability data. We collected the independent variables (experience and personality styles) at an individual level in the first interview round in 2009, and collected the dependent variables (substantive and dynamic capabilities) at an organizational level in the two follow-up rounds in 2010 and 2011. The capabilities are measured at different points in time and rated by different members of the entrepreneurial team. As the evolution of the dependent variables (substantive and dynamic capabilities) over the two interview rounds remained

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quite stable, and kappa analyses (inter-rater agreement; Fleiss, 1971) showed a moderate level of agreement between different raters of capabilities within a team, we took the mean of capability scores of different team members over the three interview rounds. Thus, the dependent variable is a combination of different respondents at different points in time, which mitigates concerns about common method bias and external validation. The comparison of revenues, capital raised, industry sector and age between respondents and non-respondents revealed no response bias (Autio, Sapienza, and Almeida, 2000).

3.5.3 Dependent variables

The capabilities were measured using a scale we developed to capture the extent to which new ventures have increased their substantive capabilities (SC) and dynamic capabilities (DC). The scale was developed based on insights from the qualitative part of this study and is, to our knowledge, the only scale to measure substantive and dynamic capabilities (Danneels, 2008). To develop the instrument, we followed Walter, Auer and Ritter (2006)'s procedure. We started by developing an initial pool of scale items based on our observations in the period during which we followed the new technology-based venture, using participant observation as a data collection technique. The initial pool of items was then pre-tested in an interview round with four new technology-based ventures. In each round, two to three interviewees from each venture were asked to complete the questionnaire. While completing the questionnaire, entrepreneurs verbalized any thoughts that came to their minds. The items were revised following each interview round. At the end of round four, feedback from the respondents indicated that the scale items were clear, meaningful, and relevant. All constructs were measured using seven-point scales. A complete listing of the scales used in the study is provided in appendix B and C.

After a purification of items through multiple iterations of exploratory factor analysis (see Walter et al., 2006), we conceptualize substantive and dynamic capabilities as two higher-order constructs, which increase in magnitude as each of their components increases, meaning that substantive and dynamic capabilities are composites which require formative measures (Diamantopoulos and Winkelhofer, 2001). Financial/HR capabilities (α= 0.80), marketing capabilities (α= 0.79) and product/technology capabilities (α= 0.74) are viewed as three components or integral parts of substantive capabilities. We created the

substantive capabilities index as a linear sum of the substantive capability component means. The reliability for this new substantive capability scale is α = 0.80. Also from a theoretical point of view, these components are domains in which companies need to develop routines to build an efficient business model and to create an outcome and generate revenues in the short run (Winter, 2003). Scanning capabilities (α= 0.67) and implementation capabilities (α= 0.74) are two components of dynamic capabilities, which show similarities with Teece's (2007) definition of dynamic capabilities.' Namely, Teece (2007) defines dynamic capabilities as the capacity of a firm (1) to sense and shape opportunities and threats, and (2) to seize opportunities and reconfigure the existing firm's assets. We created the dynamic capabilities index as a linear sum of the dynamic capability component means. Cronbach's Alpha for this dynamic capability scale is 0.75. Confirmatory factor analyses (LISREL 8) showed satisfying results for the first-order constructs and revealed that these constructs are indeed separate factors (CFI= 0.97; NFI= 0.92; SRMR= 0.04; RMSEA= 0.06; GFI= 0.95; AGFI= 0.90)[2].

To test the discriminant validity of the substantive and dynamic capabilities scales, we performed a zero-order correlation between these scales. The correlation among these scales is low to moderate at 0.27 ($p < 0.0000$), suggesting discriminant validity (Danneels, 2008). Since substantive and dynamic capabilities are typically described in the literature as strong interwoven constructs (Zahra et al., 2006), low to moderate correlation levels are to be expected. We also performed a second test to provide additional empirical support for the distinction between substantive and dynamic capabilities. In the capability literature, substantive capabilities are typically linked with achieving an outcome (Zahra et al., 2006) and making a living in the short term (Winter, 2003), while dynamic capabilities are linked with changes in business models, value propositions and resource bases (Zahra et al., 2006;

[2]The comparative fit index (CFI) examines the portion of total variance accounted for by a model and overcomes difficulties associated with sample size; 0.90 is considered an acceptable level. The normed fit index (NFI) is an incremental fit index which measures the proportionate improvement in fit by comparing the model with a more restricted baseline model; .90 is considered an acceptable level. The root-mean-square residual (SRMR) is a standardized summary statistic for residuals; .04 is considered an acceptable level. The root-mean-square error of approximation(RMSEA) is a test of the null hypothesis of close fit; .05 indicates a very good fit, .05 to .08 indicates a fair to mediocre fit. Goodness of fit (GFI) is a global indication of how well a model fits the data; .90 is considered an acceptable level. The adjusted goodness-of-fit index (AGFI) is adjusted for model parsimony;. 90 is considered an acceptable level (Busenitz, Gomez, and Spencer, 2000)

Teece, 2007). Thus, we also measured the business model changes and performance of these new ventures. The results show that the substantive capabilities scale is associated with revenues ($r= 0.24$, $p<0.05$) and gross margin ($r= 0.24$, $p<0.05$), and also correlates significantly with a subjective measure of firm performance ($r= 0.21$, $p< 0.05$), while the dynamic capabilities scale is linked with changes in the product and/or services offered by the company ($r= 0.24$, $p<0.05$) and in the way the product or service is offered on the market ($r= 0.23$, $p<0.05$). Finally, we also performed a confirmatory factor analysis (CFA) to test the discriminant validity between the higher-order constructs substantive and dynamic capabilities. The results of the CFA suggest that there is still a slight connection between these two types of capabilities (CFI= 0.72; NFI= 0.67; SRMR= 0.11; RMSEA= 0.16; GFI= 0.68; AGFI= 0.59) which is in line with previous theoretical arguments that substantive and dynamic capabilities are interwoven constructs (Zahra et al., 2006). Taking these three discriminant validity tests into account, we can conclude that these higher-order constructs are seemingly (un)related, a conclusion which is in line with previous theoretical work (Zahra et al., 2006; Helfat and Winter, 2011) and also asks for a seemingly unrelated regression analysis to account for any possible correlation between the two dependent variables, substantive and dynamic capabilities (Uzzi and Gillespie, 2002).

3.5.4 Independent variables

Personality. We used the big five inventory (BFI) measure of John, Donahue and Kentle (1991) to measure conscientiousness (CS). The conscientiousness items were administered with a seven-point scale, ranging from 1 (disagree strongly) to 5 (agree strongly). Items include 'tends to be disorganized' (reverse coded) and 'can be somewhat careless' (reverse coded). Reliability for the personality conscientiousness scale is $\alpha = 0.76$. Proactive personality (PR) was measured using the seven-point scale of Seibert, Crant and Kraimer (1999) and has a Cronbach Alpha of 0.83. Sample items include 'I am constantly on the lookout for new ways to improve my life,' and 'I love being a champion for my ideas, even against others' opposition.' In cases where there was more than one founder, we averaged the personality scores of the different members of the founding team.

Team personality. Group composition research requires individual differences to be combined to form team-level constructs (Kozlowski and Klein, 2000). The most frequently

used method is to combine individual characteristics in a linear fashion, such that the mean of individual characteristics represents the team-level construct (Stewart, 2003). Consequently, we measured the level of conscientiousness of a team (CSteam) as the mean of all individual scores on conscientiousness in one founding team. This approach is in line with existing research on team personality (Bell, 2007; Stewart, 2006). Team proactiveness (PRteam) was measured using the same method.

3.5.5 Control variables

We also controlled for other variables that might influence capability development, such as industry sector. Here, we obtained five categories: ICT, business services, biotech & pharmaceuticals, engineering and manufacturing. Secondly, we controlled for environmental uncertainty (ENVIR UNCERT) and munificence (ENVIR MUNIF). Sirmon, Hitt, and Ireland (2007) hypothesized that environmental munificence impacts the way capabilities are developed, while Zahra et al. (2006) attributed a major role to environmental uncertainty as a factor in capability development. Although we limited the variation in environmental factors through our research design, founder/managers might still have different perceptions about the environment in which they operate. Therefore, we used perceptual measures of environmental uncertainty and munificence as additional controls (Maestro, 2009). Maestro (2009) adapted a five-item scale of environmental uncertainty from Miller and Droge (1986) and Sutcliffe (1994). Items include 'Products or services quickly become obsolete in our industry' and 'Actions of competitors in our industry are quite easy to predict (reversed code).' The six-item scale of environmental munificence (Maestro, 2009) was based on Sutcliffe (1994) and Zahra (1993). Items include 'Resources needed for growth and expansion are in abundance and easily accessible in our industry (reverse code)' and 'Demand for products and services in our industry is growing and will continue to grow.' We also controlled for the founders' years of work experience of prior to starting the venture (INDUST EXP). The capability literature suggests that pre-founding experience can have a similar impact to post-founding experience. Finally, we included a dummy variable to indicate whether the company had reached the stability phase or not (BOARD). We considered that a company had reached this phase if it had raised venture capital and if it had installed a board of directors on which external advisors

held a seat. Clarysse et al. (2011) suggest that this is a moment at which resource structuring evolves into capability formation.

3.6 Results

The means, standard deviations and correlations of the variables are presented in Table 4, showing that 44% of the founders had previous start-up experience and the average founder had 8 years of work experience. These figures are consistent with past research (Clarysse et al., 2011; Bhide, 2000; Baum, Bird and Singh, 2011; Ucbasaran, Westhead, and Wright, 2006; Wiklund and Shepherd, 2008). In our sample, 71% of the ventures were started by a team of entrepreneurs rather than a single founder, which is also in line with the entrepreneurship literature focusing on high-tech start-ups (Davidsson and Wiklund, 2001; Francis and Sandberg, 2000). The average team size is 2.32 and can be considered normal (Heirman and Clarysse, 2004; Beckman et al., 2006). In general, the descriptive statistics of our sample are consistent with previous entrepreneurship studies.

TABLE 4: Means, standard deviations, reliabilities, and intercorrelations of study and control variables

	Mean	Std Dev	1	2	3	4	5	6	7	8	9	10
1. SC	4.45	0.70	1.00									
2. DC	4.95	0.64	0.27**	1.00								
3. PR	5.29	0.80	0.09	0.27**	1.00							
4. CS	5.39	0.79	0.24**	0.02	0.17*	1.00						
5. PRteam	5.19	0.63	0.16	0.39**	0.57**	0.11	1.00					
6. Csteam	5.47	0.63	0.34**	0.08	0.11	0.54**	0.16	1.00				
7. INDUST EXP	8.00	6.92	0.12	− 0.07	− 0.22**	0.06	− 0.22**	0.13	1.00			
8. BOARD	0.59	0.49	0.31**	0.06	− 0.11	0.01	− 0.08	0.07	0.03	1.00		
9. ENVIR UNCERT	4.22	1.09	0.24**	− 0.04	− 0.00	0.16	0.07	0.19*	− 0.05	0.10	1.00	
10. ENVIR MUNIF	4.62	0.75	0.16	0.28**	0.19*	0.05	0.22*	0.02	− 0.11	− 0.05	0.10	1.00

* Significant at $p < 0.05$ (two-tailed)

** Significant at $p < 0.01$ (two-tailed)

n= 144

Table 5 summarizes the results of the regression analyses. To test our hypotheses, we performed seemingly unrelated regressions (SUR) with substantive and dynamic capabilities as dependent variables. SUR is a generalization of a linear regression model that consists of several regression equations, each having its own dependent variable and potentially different sets of exogenous explanatory variables (Zellner, 1962). This method is

often used for simultaneously estimating a system of nonparametric regressions which may seem unrelated, but where the errors are correlated between equations (Uzzi and Gillespie, 2002), as is the case for substantive and dynamic capabilities. The extant literature has shown that substantive and dynamic capabilities are closely interrelated (Zahra et al., 2006; Helfat and Winter, 2011). By using a SUR, we were able to address these theoretical issues. Moreover, previous research has shown that the advantage of estimating such a seemingly unrelated system of nonparametric regressions is that fewer observations are required to obtain reliable function estimates than if each of the regression equations were estimated separately and the correlation ignored (Smith and Kohn, 2000). The highest VIF was below 2.40 for regression models 1 and 2 and below 4.26 for regression model 3, which means that multicollinearity did not pose a problem for the regression models (Neter, 1990; Walter et al., 2006). Because we have multiple respondents per company over multiple years, we calculated the Kappa (inter-rater agreement, Fleiss 1971) of their subjective evaluative perceptions of the extent to which they rated substantive and dynamic capabilities in their companies, for each of the companies in the study. The Kappa ranged from 0.47 to 0.58, which indicates a moderate agreement. In each of the cases, the Kappa was statistically significant. In order to avoid common method bias, we performed CFA between all key variables in this study and measured the independent and the dependent variables at a different point of time (Podsakoff et al., 2003). As a small number of companies in our sample do not have an entrepreneurial team, we performed additional robustness checks by testing the regression model with and without companies with one founder. However, the results showed no differences. Finally, we also clustered for company ID in Models 1 and 2.

Model 1 includes only the control variables to explain substantive and dynamic capabilities. The previous work experience of the founders does not have a significant impact on the development of either dynamic or substantive capabilities. In contrast, stage of development of the venture, measured by the fact that either the venture had attracted VC investment or had installed a board of directors, predicted development of substantive capabilities. After introducing the direct effects in Model 2, the explanatory power increases significantly from .25 to .32 and from .13 to .25 for substantive and dynamic capabilities

respectively. H1 which posits that degree of conscientiousness in the founding team (or of the founder for ventures started by a single founder) will positively impact the development of substantive capabilities is also supported at the .01 level, while we do not find a significant relation between conscientiousness and development of dynamic capabilities. This means that H1b also receives support. H2a which states that proactive personality positively impacts development of dynamic capabilities is also supported at the .01 level. Supporting H2b, we do not find a relationship between proactive personality and development of substantive capabilities. In Model 3, we introduce the interaction coefficients. Explanatory power of the model increases significantly from 0.32 to 0.34 for substantive capabilities and from 0.25 to 0.27 for dynamic capabilities. H3a which states that proactive individuals will not develop substantive capabilities unless they have a conscientious partner in the team receive support at the 0.01 level, while H3b which articulates that conscientious individuals will not develop dynamic capabilities unless they have a proactive partner is also supported at the 0.01 level.

TABLE 5: Seemingly unrelated regression with substantive capabilities (SC) and dynamic capabilities (DC) as dependent variables

Variables	MODEL 1		MODEL 2		MODEL 3	
	SC	DC	SC	DC	SC	DC
Sector dummies						
ICT	-0.50(0.23)*	-0.29(0.28)	-0.41(0.22)*	-0.20(0.17)	-0.45(0.16)**	-0.23(0.16) †
Business services	-0.29(0.26)	-0.10(0.33)	-0.39(0.22) †	-0.21(0.33)	-0.38(0.22)*	-0.21(0.22)
Biotech & Pharmaceuticals	-0.12(0.29)	-0.43(0.26)*	-0.14(0.29)	-0.44(0.27)*	-0.22(0.21)	-0.50(0.20)**
Engineering	-0.49(0.29)*	-0.29(0.28)	-0.48(0.30) †	-0.20(0.29)	-0.46(0.21)*	-0.20(0.21)
Manufacturing	0.38(0.23)*	0.03(0.34)	0.39(0.22)*	0.05(0.38)	0.43(0.41)*	0.20(0.37)
Environmental uncertainty (ENVIR UNCERT)	0.19(0.05) †	-0.06(0.08)	0.14(0.12)	-0.07(0.08)	0.12(0.06)*	-0.10(0.05)*
Environmental munificence (ENVIR MUNIF)	0.15(0.08)*	0.26(0.09)**	0.13(0.08)*	0.20(0.09)**	0.18(0.08)**	0.21(0.07)**
Industry experience (INDUST EXP)	0.01(0.01)	-0.00(0.01)	0.01(0.01)	0.00 (0.01)	0.01(0.01) †	0.01(0.01)
Stability phase (BOARD)	0.44(0.19)**	0.19(0.18)	0.43(0.18)**	0.26(0.17) †	0.54(0.12)**	0.32(0.12)**
Conscientious team (CSteam)			0.26(0.12)**	-0.00(0.09)	-0.02(0.10)	0.05(0.14)
Proactive team (PRteam)			0.12(0.11)	0.40(0.10)**	0.06(0.14)	0.02(0.10)
Conscientious founder (CS)						-0.40(0.15)**
Proactive founder (PR)					-0.24(0.16) †	
Proactive founder x conscientious team (PR_CSteam)					0.06(0.03)**	
Conscientious founder x proactive team (CS_PRteam)						0.07(0.02)**
Cons	2.97(0.69)	4.13(0.54)	1.23(0.98)	2.27(0.72)	2.40(0.81)	4.16(0.77)
R^2	0.25	0.13	0.32	0.25	0.34	0.27
	(F=1.92)	(F=1.80)	(F=2.47)	(F=3.37)	(F=4.86)	(F=2.73)
n	144	144	144	144	144	144

Significance tests are one-tailed for hypothesized relations and two-tailed for controls.

†p<0.10, *p<0.05, **p<0.01

3.7 Discussion

We show in this study that personality traits and experience of founders play an important role in developing capabilities after company start-up. We make several contributions to the capability literature. First, we show that the micro-foundations measured as personality types at individual level, aggregated if appropriate to the level of the founding team, explain why ventures either develop substantive or dynamic capabilities. We therefore add to the theoretical foundation of the capability perspective, which has been criticized for being endogenous in explaining the factors which determine the emergence of capabilities. Second, we show that these individual-level antecedents influence the development of substantive and dynamic capabilities separately. To our knowledge, no study has been able to identify antecedents of capability development which might explain why organizations in a similar environment might be different in terms of developing dynamic and substantive capabilities. Helfat and Winter (2011) argue that even in static environments some organizations develop dynamic capabilities, while others do not. However, we show here that personality differences of individual decision makers and the average 'personality' of the dominant coalition in the firm provide a theoretical explanation for the fact that some ventures develop only substantive capabilities while other ones succeed in the same environment in building dynamic ones. Hence, our research contributes to disentangling substantive from dynamic capabilities as two different constructs. Third, we also make an empirical contribution. This study is, to our knowledge, the first to develop an instrument to measure substantive and dynamic capabilities as two different constructs. We elaborate each of these contributions below.

First, we provide a theoretical explanation for the origins of organizational capabilities, rooted in the micro-foundations of the firm. More specifically, building upon the personality literature, we show that conscientious founders and their teams foster the development of substantive capabilities. While most studies on capability development focus on firm level factors, we find that an individual level factor, that of conscientiousness, predicts substantive capability development. This personality type impacts the way in which the venture is structured and predicts the extent to which the founder emphasizes the development of procedures to increase the venture's efficiency. However, to sense or shape

new opportunities and to change existing substantive capabilities, new ventures need to develop dynamic capabilities. Our findings indicate that conscientious founders lack interest in developing these capabilities. Figure 9 suggests that highly conscientious individuals are even negatively oriented towards development of dynamic capabilities. The simple slope analysis (figure 9 and 10) also clearly shows that conscientious individuals need proactive team members to develop dynamic capabilities. Hence, if conscientious founders team up with proactive co-founders, their ventures do develop dynamic capabilities. Our results also show that proactive personalities have a strong positive impact on the development of dynamic capabilities, while they ignore the development of substantive capabilities. We further find that firms with proactive entrepreneurs without conscientious co-founders tend not to develop substantive capabilities. This means that proactive individuals will also benefit from working with conscientious co-founders. Because personality types and the behaviors which result from them are found to impact the development of capabilities in different ways, we provide a strong theoretical explanation for the foundations of capability development.

FIGURE 9: Graphical Presentation of Interaction between 'conscientiousness' and 'proactiveness' on substantive capabilities

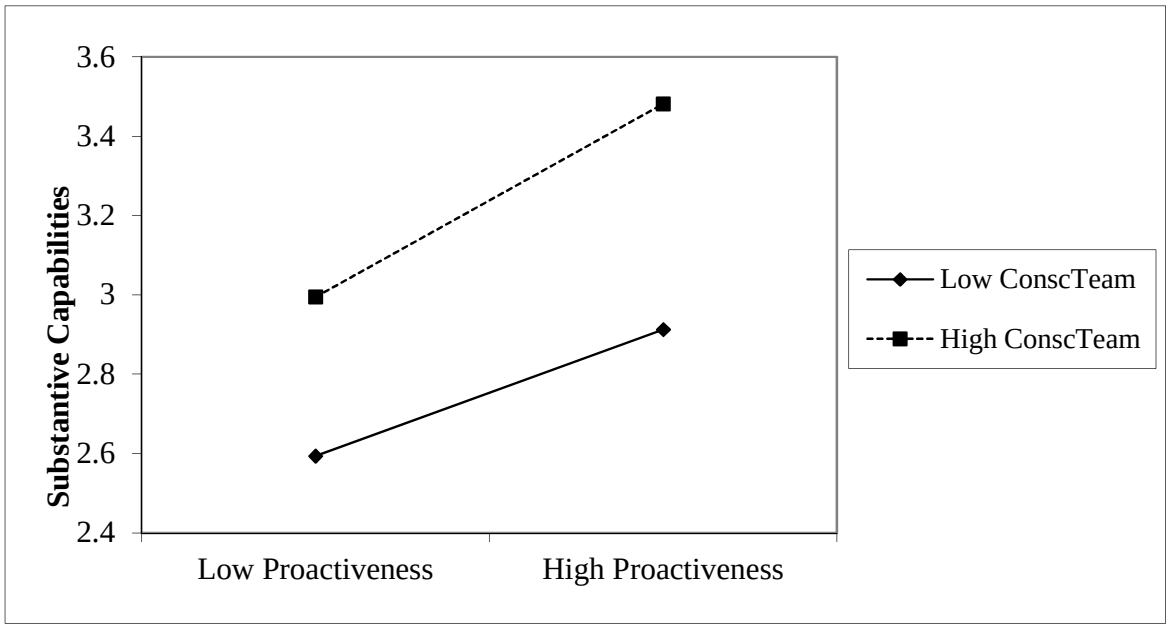
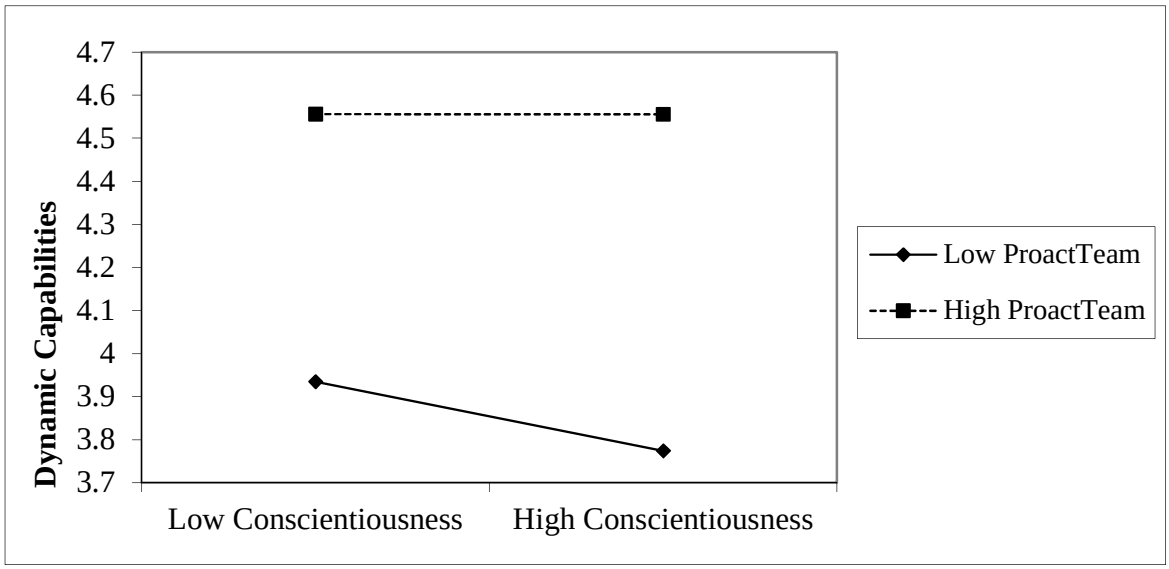


FIGURE 10: Graphical Presentation of Interaction between 'conscientiousness' and 'proactiveness' on dynamic capabilities



Secondly, we show that substantive and dynamic capabilities are different constructs that find their roots in very different individual-level personalities. Much of the confusion about both types of capabilities might be attributed to the fact that both types of capabilities are affected by organizational-level antecedents such as experience or learning in the same way. In other words, we also show that both capabilities accrue over time, so successful ventures will eventually develop both in an interrelated way. This confirms the proposition of Felin and Foss (2011) that the origins of organizational capabilities tend to be endogenous. Even in a similar environment such as the volatile context of young technology-based firms, both substantive and dynamic capabilities are built up and have a role to play. However, the personality types of the founders will determine which form of capabilities is emphasized.

Thirdly, we show that substantive and dynamic capabilities are indeed different. Based upon an in-depth case study using participant observation to develop insights in a theoretically complex domain, we succeeded in identifying routines within a venture that could be associated with either increasing the efficiency of operations, i.e. substantive capabilities, or changing the business plan and model to reflect new environmental

challenges, i.e. dynamic capabilities. Based on our participant observation and several rounds of scale refinement, to our knowledge, we developed the first instrument to differentiate dynamic and substantive capabilities. Other available instruments (such as Danneels, 2008) only measure dynamic capabilities. We show that, although development of substantive and dynamic capabilities are related to each other, they are determined by different antecedents. In addition, we find that the environment impacts development of capabilities. We show that entrepreneurs who start a company in an environment which they consider to be uncertain develop more substantive capabilities, whereas entrepreneurs who start a business in an environment which they consider to be munificent tend to develop dynamic capabilities. Substantive capabilities can bring structure in uncertain environments while dynamic capabilities require different resources to be added.

Finally, our study extends existing research on effects of upper-echelons team composition on team outcomes. Some studies on team composition focus mostly on diversity effects (e.g., Foo, Wong, and Ong, 2006) while other researchers include average team characteristic (e.g., Kearney, Gebert, and Voelpel, 2004). Our study shows that a configurational approach can also predict firm outcomes when team members' characteristics complement each other. Relatedly, this study reinforces the key role of top managers in determining firm-level outcomes, including those of strategy, decisions, structure, and profits (c.f. Castanias and Helfat, 1991, 2001). Yet, despite the important role of micro-foundations in firm outcomes, the role of individual characteristics on development of firm capabilities remains largely unknown.

In sum, we provide a new theoretical understanding of how capabilities emerge in new ventures, rooted in the micro-foundations of the firm, by showing that substantive and dynamic capabilities are championed by very different types of entrepreneurs. These findings suggest that specific characteristics of founding team members and joint characteristics of these founders predict development of substantive and dynamic capabilities.

3.8 Limitations and further directions

This study is the first to examine which personality traits lead to the development of substantive capabilities and which are more suited to fostering the development of dynamic capabilities. While this study already reveals that conscientiousness and proactiveness are two personality types which are useful in the beginning of a company's life, future studies could analyze how additions or changes in the team of founders can speed up or slow down the development of certain capabilities. Future work could also explain why experience in setting up a structure and developing substantive capabilities can be transferred more easily to another start-up company as opposed to the experience in sensing or shaping new opportunities. Finally, this study found that firms with both conscientious and proactive founders have a positive impact on the development of substantive and dynamic capabilities which is found by previous research to be beneficial for firm performance (Drnevich and Kriauciunas, 2012). However, we did not consider the potential tension between these two types of founders which could generate conflict between these team members and eventually have a negative impact on firm performance.

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APPENDIX B: Substantive capabilities scale

Different companies are good at different things. The following questions ask you to assess your company's skills in various areas, relative to other start-ups. Relative to other start-ups, my company has …

	Strongly Disagree						Strongly Agree
1.An efficient financial dashboard (i.e. signalling different potential problems in cashflow, ….)	1	2	3	4	5	6	7
2.A structured product roadmap (i.e. what the different milestones are and tasks to build the product/service)	1	2	3	4	5	6	7
3.A clear marketing and communication plan	1	2	3	4	5	6	7
4.Clear distribution channel management	1	2	3	4	5	6	7
5.Strong milestone planning which, in time, enables the delivery of products/services	1	2	3	4	5	6	7
6.An efficient recruitment system	1	2	3	4	5	6	7
7.An efficient cost control system	1	2	3	4	5	6	7
8.An efficient HR management system, which allows us to hire/fire people	1	2	3	4	5	6	7

APPENDIX C: Dynamic capabilities scale

Different companies are good at different things. The following questions ask you to assess your company's skills in various areas, relative to other start-ups. Relative to other start-ups and based on new information, my company is good at …

	Strongly Disagree						Strongly Agree
1. Assessing the potential of new markets	1	2	3	4	5	6	7
2. Researching new competitors and new customers	1	2	3	4	5	6	7
3. Assessing the feasibility of new technologies	1	2	3	4	5	6	7
4. Identifying promising new technologies	1	2	3	4	5	6	7
5. Changing the marketing and communication plan	1	2	3	4	5	6	7
6. Altering the product roadmap	1	2	3	4	5	6	7
7. Making changes to the global delivery model / distribution channels	1	2	3	4	5	6	7
8. Revising the technology roadmap	1	2	3	4	5	6	7

4 The Contribution of Dynamic Capabilities to New Venture Survival in Nascent Markets: The Boundary Role of Stability

ABSTRACT

The dynamic capability literature has argued that dynamic capabilities are of most importance to companies that face dynamic environments. New ventures in nascent markets are in such a situation. They need to develop dynamic capabilities to survive. However, the literature remains silent when it comes to the boundary conditions under which these dynamic capabilities have most impact on survival. We extend the literature on dynamic capabilities by showing that firm stability measured as role formalization in the founding team and redundancy at the work floor increases the impact of dynamic capabilities. We therefore contribute to the literature on dynamic capabilities by showing its duality with company stability. However, the installation of a board with external directors decreases the impact of dynamic capabilities. We explain this by the decreased resource cognition among the decision makers at board level which undermines the positive impact of venture stability.

KEY WORDS: Dynamic capabilities, nascent markets, firm survival, firm stability

The Contribution of Dynamic Capabilities to New Venture Survival in Nascent Markets : The Boundary Role of Stability

4.1 Introduction

The extant literature on dynamic capabilities has focused on how large companies gain a competitive advantage if they are able to develop these capabilities in preferably but not exclusively dynamic environments (Helfat and Peteraf, 2003; Teece, 2007; Helfat and Winter, 2011). Dynamic capabilities are generally considered as the capacity of a firm to change its resource base (Helfat and Peteraf, 2009). Zahra, Sapienza and Davidsson (2006) extended the dynamic capability perspective to entrepreneurial companies, arguing that also these companies benefit from dynamic capabilities as they allow new ventures to be able to continuously create, define, discover and exploit entrepreneurial opportunities. Dynamic capabilities differ from entrepreneurial capabilities as they encompass the firm's capacity to change its business model and resource base towards new, emerging opportunities whereas entrepreneurial capabilities refer to the identification of opportunities and the development of a resource base to pursue these opportunities (Arthurs and Busenitz, 2006). Overall, the dynamic capability perspective suggest that dynamic capabilities are needed to build up a competitive advantage both in large and small firms. However, the extant literature falls short in explaining the boundary conditions at firm level under which these dynamic capabilities lead to better performance. This is the theoretical gap we address in this paper.

Researchers in the domain originally assumed that dynamic environments triggered the use of a firm's dynamic capabilities (Teece et al., 1997; Teece, 2007). More recently, Helfat and Winter (2011) and Drnevich and Kriauciunas (2012) showed that although dynamic capabilities might be more useful in dynamic environments, they also lead to competitive advantage in less dynamic ones. Beyond the environment, the literature remains silent when it comes to boundary conditions at company level. Zahra et al. (2006) hypothesize that dynamic capabilities will accrue over time and form a complex set of inter-relations with operational or substantive capabilities but do not touch upon the internal organizational form which might be needed to optimize the impact of dynamic capabilities.

Farjoun (2010) argues that change is most effective when it is embedded within stability. This implies that dynamic capabilities might be most effective in an organization which also has sufficient stability to embody change. Even in new ventures, stability is needed to avoid the chaos which tends to be associated with major changes (D'Aveni, Dagnino and Smith, 2010).

The extant entrepreneurship literature has identified a number of factors which lead to stability in new ventures. These stability factors are situated in three hierarchical layers, which can be found in most new ventures: operational level, founding team or (early) top management level and board of directors level. These factors are even more important for the stability of new ventures active in nascent markets. Nascent markets are environments that are characterized by turbulence and uncertainty and therefore necessitate change and flexibility (Sine and David, 2003; Santos and Eisenhardt, 2009). First, Sine, Mitsuhashi and Kirsch (2006) show that new ventures in such markets need formal structures in order to overcome liabilities of newness (Stinchcombe, 1965). Whereas formal structures tend to inhibit change in large, established firms, new ventures typically start-up in dynamic environments and need a structured founding or (early) top management team to deal with the role ambiguity and uncertainty which accompanies change in the environment (Sine et al., 2006). Second, new ventures reach stability through the involvement of external stakeholders which act as financers, catalysts and monitors (Garg, 2012). External stakeholders tend to participate in the decision making process through the board of directors which forms the key governance mechanisms of new ventures (Dowell et al., 2011). Boards track the significant behaviors of the founders, the outcomes of their actions, and the performance of the venture in order to ensure that corrective action is taken as needed (Garg, 2012). Monitoring in new ventures increases their stability in markets that call for frequent changing of direction because changes are extensively discussed and benchmarked before implementation. When the firm decided to restructure their business activities, boards use their experience to advise the management team and provide them access to the necessary resources to support these changes. Finally, new ventures do increase their levels of stability through introducing redundancy (Farjoun, 2010) or slack (Greve, 2003; George, 2005) into their operational system. Redundancy allows managers to

let their people on the work floor experiment (Jelinek and Schoonhoven, 1990) without the risk of underperformance in the core business (Greve, 2003) and avoids that a system collapses when part of the attention is redirected towards a new market opportunity (Simon, 1996). Redundancy also improves communication between people with overlapping bundles of knowledge and avoids that opportunities remain isolated due to a lack of shared cognition (Weick and Roberts, 1993).

In this paper, we empirically test whether dynamic capabilities will decrease the probability of failure of new ventures in nascent markets. We theoretically contribute to the dynamic capability literature by extending this perspective into the extant literature on organizational theory which proposes organizational stability as an important determinant of firm success and which has recently shed a new light on the relation between stability and change, presenting it as a duality of reinforcing concepts (Farjoun, 2010). We therefore hypothesize that organizational stability is a boundary condition for dynamic capabilities to enhance the survival potential of a new venture.

To examine our central questions and to test our hypotheses, we use a panel of 124 new ventures founded in the period 2006-2008, which we followed over time in the period 2009-2012 using several interview rounds to collect data on the development of their dynamic capabilities. We used a hazard model to investigate the impact of dynamic capabilities on firm survival. Hazard models have been used extensively and in a wide variety of contexts in the innovation and strategy literatures (Sinha and Noble, 2008). This type of analysis allows for the modeling of failure at each time point, and considers both the occurrence and timing of a failure (Cui et al., 2010). The new ventures were selected based upon the fact that they did apply for an innovation grant with the Flemish Government to finance the development of a business plan with the specific objective to raise venture capital. Only new ventures which enter into nascent markets of which the industry structure is not clear yet are eligible for this type of financing. We choose this empirical context because new ventures are less complex than more established firms, so they provide a comparatively clean setting for an empirical exploration of the effect of resources and capabilities (Gruber et al, 2010).

This study theoretically extends the literature on dynamic capabilities towards organization theory where scholars tend to focus on stability as an important element of organizational performance. First, we show that formalization improves the impact of dynamic capabilities on the performance of new ventures. More specifically, we show that dynamic capabilities benefit from clear internal role specialization and formalization of the founding team. Second, we show that redundancy on the work floor has a similar impact on the relation between dynamic capabilities and performance. Third, we show that boards, which are considered a third source of stability, do not have the same impact on the relation between dynamic capabilities and new venture performance. On the contrary, boards limit the impact of dynamic capabilities. Boards typically monitor the new venture performance based upon an agreed business plan which is difficult to change. External directors in boards might be too distant from the new venture's operations to be assistive in implementing changes.

We structure the paper as follows. First, we draw on theoretical insights from both organizational design and boards as well as dynamic capabilities to develop our hypotheses. Next, we present details on our methodological and sampling approach. Finally, we close with a discussion of the results and implications for theory and practice.

4.2 Theory and hypotheses development

New ventures in emergent economic sectors or nascent markets start up in environments that are characterized by turbulence and uncertainty (Sine and David, 2003; Santos and Eisenhardt, 2009). Nascent markets lack a dominant logic to guide actions (Kaplan and Tripsas, 2008) and therefore form important challenges to new ventures which operate in these markets. Due to a lack of legitimated industry logics, the new ventures have difficulties to identify which resources are strategic (Bingham, Eisenhardt and Davis, 2009) and to develop associated business models (Ozcan and Eisenhardt, 2009). Survival rather than efficiency is the main objective of ventures in these markets (Santos and Eisenhardt, 2009). New ventures that want to survive in these nascent markets will need to develop capabilities which allow them to navigate through the ambiguity which usually is associated with these markets.

The capability literature has made a distinction between substantive and dynamic capabilities (Eisenhardt and Martin, 2000; Helfat and Peteraf, 2003; Zahra et al., 2006; Helfat and Winter, 2011). Whereas substantive capabilities represent the firm's capacity to develop routines which make its living and hence directly contribute to the efficiency of the company, dynamic capabilities refer to its capacity to change its resource configuration and business model. Teece (2007) further describes a firm's dynamic capabilities as its capacity to 'sense' opportunities, 'seize' these opportunities in terms of developing an appropriate business model and eventually 'implement' change through applying this business model.

Early proposals in this field clearly assumed a direct relationship between firms' dynamic capabilities and their performance (Teece et al., 1997). These authors stated that this framework is intended to explain firm-level success and failure, competitive advantage, and private wealth creation (Teece et al., 1997; Makadok, 2001; Zollo and Winter, 2002). More recently, Teece (2007) stated that "the ambition of the dynamic capabilities framework is nothing less than to explain the sources of enterprise-level competitive advantage over time" and that "dynamic capabilities lies at the core of enterprise success (and failure)." However, other researchers took a more cautious approach towards the relation between performance and dynamic capabilities. In their view, long-term competitive advantage does not only rely on dynamic capabilities themselves but on the resource configurations or substantive capabilities created by the dynamic capabilities (Eisenhardt and Martin, 2000; Winter, 2003; Helfat and Winter, 2011). However, these theoretical arguments are mostly developed in the context of established firms and for the purpose of creating a sustainable competitive advantage (Barreto, 2010).

Since substantive capabilities are efficiency oriented, we might expect that dynamic capabilities will be the key capabilities that are needed to survive the difficult early stages of new ventures in nascent markets. The development of dynamic capabilities will allow the new venture to be alert for new emerging logics in the market and will allow it to adjust its business model accordingly, if necessary. On the contrary, the lack of dynamic capabilities might constrain the viability of a new venture in a nascent market. Bingham (2009) shows that experimentation is needed in seizing the opportunities in order to be successful in new, unfamiliar markets. This means that new ventures need to be able to experiment with

different business models and resource configurations that are in line with these business models in order to be successful in these markets. Hence, a lack of dynamic capabilities, which allow new ventures to detect new logics in the market and eventually adjust their business model and resource configuration, will lead to rigidities and eventually lead to new venture failure. Autio, George and Alexy (2011) argue that in environments such as nascent markets a lack of substantive capabilities might even be an advantage. This implies that those ventures which develop substantive capabilities will even have higher failure rates if they lack dynamic capabilities which allow them to change these substantive capabilities than if they have no capabilities at all. In line with the dynamic capability literature, we therefore hypothesize:

H1 The Development of Dynamic Capabilities will decrease the Probability of Failure of New Ventures in Nascent Markets

While dynamic capabilities can be viewed as important mechanisms to guide new ventures through the difficult early stages, Farjoun (2010) does alert that in order to survive, organizations must reconcile stability with change. Organizing for firm survival and growth in nascent markets means that new ventures should be able to sense and seize new opportunities and reconfigure existing capabilities (Teece, 2007). However, the level of rivalry and innovativeness in these nascent markets could escalate, making dynamic capabilities the instrument of ever greater chaos (D'Aveni et al., 2010). Therefore, organizational behaviorists suggests that firms need "stable building blocks" in order to facilitate change and benefit from these changes (Farjoun, 2010; Schreyögg and Sydow, 2010; Smith and Lewis, 2011). These studies advocate structure and stability as necessary elements to undertake change.

Along the same lines, Sine et al. (2006) already emphasized that new ventures in nascent markets need formal structure to prosper in these markets and overcome what Stinchcombe (1965) has referred to as the liability of newness which new ventures face. This implies that in new ventures, especially in nascent markets, some form of structure is needed in which dynamic capabilities should be embedded. Zahra et al. (2006:918) argue

that Teece's organizational level process of sensing, seizing and shaping opportunities corresponds in new ventures to the entrepreneur, the entrepreneurial team or the firm's senior management 'perception' of opportunities, their 'willingness' to undertake change and their 'ability' to implement changes. In other words, a central role is allocated to the founding team and the key decision makers in the dynamic capability process. However, the dynamic capability literature remains largely silent when it comes to describe how these founding teams might impact the overall relation between dynamic capabilities and performance (Sirmon et al., 2011).

Sine et al. (2006) formalize structure by identifying role formalization in founding teams. Following Dalton et al. (1980), Sine et al. (2006:122) define formalization of organizational tasks as the 'identification and designation of particular functional roles and their assignment to specific individuals'. Role formalization avoids confusion about who is supposed to do particular routine tasks. Having formalized roles in the founding team of a new venture implies that there is a clear attempt to decrease the ambiguity of the environment as each team member will know exactly what to do and coordination costs decrease. Coordination costs refer to the costs associated with the efforts needed to resolve disputes, disagreements, or conflicts about the nature and the scope of the change needed (Zahra and Nielsen, 2002). Zahra et al. (2006) already refer to the need for integration if dynamic capabilities need to be developed. Dynamic capabilities assume that opportunities are identified and decisions are made about how to address new, emerging opportunities. If the roles in the founding team are clearly allocated, it is likely that these decisions will be taken easier since every member has a specific domain (e.g. technology, marketing, operations,…) for which he/she is responsible and trustworthy.

A lack of role formalization might on the contrary lead to total chaos in the case of change. In the latter case, the different founding members will have an opinion about all the functional domains and about what needs to be done in each of these domains in order to adjust to the new insights or opportunities which emerge when markets develop. A lack of clear role alienation will force new ventures to rely upon decision making by consensus (Sine et al., 2006). This decreases the speed of decision making and also increases the costs to arrive at any particular decision. In other words, developing dynamic capabilities and

getting most out of them will become extremely difficult in these ventures. At any of the three stages in the process of these capabilities, a lack of consensus can collapse the impact of capabilities. We therefore hypothesize:

H2 The negative impact of dynamic capabilities on the probability of failure will increase with greater role formalization in the founding team

Sine et al. (2006) refer to the role formalization among founding team members as an indicator of organizational structure and flexibility. However, not only internal structures do bring stability to new ventures. Garg (2012) argues that the boards of directors in these ventures are of critical importance because they have, as a key governance mechanism in new ventures, a monitoring function in addition to their more frequently recognized advisory role (Wasserman and Boeker, 2010). Monitoring, which can be defined as the director's activities which involve the tracking of founder behavior to make sure that corrective action is taken if needed, is critical to ensure the stability of ventures in markets that call for frequent changing of directions such as nascent markets. The monitoring function of boards in new ventures is distinct from public firms, where boards almost exclusively have been studied, as the separation between ownership and control disappears in new ventures. The key management typically consists of the founding team, which tends to have similar financial interests with other firm owners such as outside investors that are represented in the board (Wasserman, 2006). Because of the financial stake of these investors in the new ventures, the latter tend to be more involved in monitoring than typical directors in public firms. Hence, one can see the board of directors of a new venture as the enlarged management team which monitors the actions of the founder-managers.

As new ventures in nascent markets do face ambiguity (Santos and Eisenhardt, 2009) and shifting industry structures (Ozcan and Eisenhardt, 2009), traditional financial metrics such as profit are usually unavailable. Therefore venture board members will monitor both strategic and operational activities and will do this on a frequent basis. Typically, venture boards are likely to make sure that strategic decisions of the founder-CEOs keep the firm's focus on growth instead of the personal goals of these founder-CEOs such as realizing an

original product vision and maintaining a particular organizational culture (Tuggle et al., 2010; Garg, 2012). Therefore, it is likely that boards will both stimulate and challenge new opportunities that emerge and/or new logics that are formed in nascent markets. Moreover, besides their monitoring and advisory role, boards can also provide new ventures the access to resources to adjust the new venture's business model in line with these new identified opportunities or new formed logics (Dowell et al, 2011). In sum, boards provide a formal structure to the new venture which allows the founding team to benchmark its ideas, forces the team to carefully reflect upon potential changes and gives them access to additional resources.

A lack of boards does not force the venture team into the same form of rigidity. Hence, founding team members do not have to present their ideas to external board members before they take actions. They can take these actions as intuitive responses to external opportunities which they might or might not consider to be personally important. A lack of formal reporting to external board members means that they are not obliged to report to these externals nor to reflect upon their strategic choices. In this case, it will be solely up to the individual capacity of the founders whether they will be able to make efficient decisions to change strategically or not. A lack of external board members also means that the founding team loses a financial structure and potential links to new investors (Certo, 2001; Dowell et al, 2011) which can be very necessary if the firm wants to change their existing resource configuration and capabilities into more profitable directions. Therefore we hypothesize :

H3: The negative impact of dynamic capabilities on the probability of failure will increase with the availability of an external board in the new venture

A third source of stability can be found in the amount of "redundancy" which is available in the new venture (Farjoun, 2010). In contrast to the dominant thinking in organizational design, which assumes that efficiency creates stability, the extant literature on reliability has argued that perfected parts can fail and, particularly in tightly coupled systems, can lead to a global failure. Instead, some form of redundancy increases flexibility as it allows knowledge overlaps and avoids system failure if one of the components drops out. The

principle of attaining reliability through redundancy is also illustrated by Weick and Roberts (1993). In complex environments such as nascent markets, no individual has all relevant information and if he/she would, he/she would immediately constitute an "unreliable" element in isolation. Instead, cognitions are distributed around the company and need to be managed. Consequently, some knowledge overlap between individuals can help them identify potential problems and solutions and address breakdowns in the fault lines between interdependent activities. In sum, redundancy at the work floor allows the company to explore different directions and allocate individual's attention towards these without fearing that the organization immediately falls apart.

Albeit from a different perspective, also the behavioral theory of the firm introduces redundancy - more generally referred to as organizational slack - as a boundary condition for stability and eventually, exploration and even innovation (Cyert & March, 1963; Greve, 2003). Organizations with spare time and spare resources have greater opportunities for experimentation, have less strict performance monitoring and have the resources needed to enable change. Jelinek and Schoonhoven (1990) show that managers can formalize slack by allocating amounts of time for product developers to work on their own projects and applying loose performance standards for new projects. Danneels (2008) shows that firms with slack financial and human resources are able to deploy these resources to change the existing resource configurations. Slack resources are available to hire new experts, buy new equipment or materials, etc. that are not directly related to the firm's current activities. Although most of the slack literature refers to larger organizations, George (2005) shows that also resource constraint organizations do have slack and do benefit from slack under conditions of uncertainty. Privately held firms and new ventures tend to outperform larger ones because resource constraints enable efficiency (Greve, 2003; George, 2005). However, slack enables what Greve (2003) has called slack search processes, which in turn lead to exploration activities and change in resource configurations (Danneels, 2008).

Slack and redundancy are two interrelated concepts which are shown to bring stability and exploration, especially at the lower levels of the organization. We might expect that dynamic capabilities, which by definition include search processes and mechanisms to implement the results of these search processes, will benefit from redundancy in a number

of ways. First, redundancy will allow employees to improve their scanning activities and explore changes in the environment, which is particularly important in nascent markets characterized by an absence of dominant designs or industry architectures (Danneels, 2008; Greve, 2003). In addition, redundancy will facilitate the decision of the management team to allow employees to implement part of these changes as the other parts of the organization will not necessarily fall apart from having some people who devote time to these (Farjoun, 2010). Third, redundancy allows employees to spend time to communicate the necessary change processes that are needed to adjust to the opportunities that are created by the environment. Therefore we hypothesize:

H4: The negative impact of dynamic capabilities on the probability of failure will increase with amount of redundancy in the new venture

4.3 Methods

Our objective in this research is to consider the boundary conditions on the central premise that dynamic capabilities influence new venture survival. We use a hazard modeling framework to investigate the impact of dynamic capabilities on firm survival. Hazard models have been used extensively and in a wide variety of contexts in the innovation and strategy literatures (Sinha and Noble, 2008).

4.3.1 Sample and data collection

This study gathered survey and secondary data on new technology-based firms founded in Flanders (northern part of Belgium). We started with a list of 211 new ventures, which was provided by the Flemish agency for innovation by science and technology (IWT). After checking the founding years from the BELFIRST database, we chose to eliminate companies older than 3 years at the time of the first interview round (2009). This approach is consistent with the operationalization of new ventures (Zahra, Hitt, and Ireland, 2000). Even though different age ranges have been used in the literature, there is a growing consensus that firms 6 years and younger are new ventures (Zahra et al., 2000). In all, we contacted 185 companies. Of these, 6 new ventures had ceased to exist by the time we sought to contact them, because they had been acquired or dissolved. Eventually, we

collected general data about the founders, management teams, business models and founding conditions of 148 new ventures (response rate 80%) in the first interview round. This baseline information was collected by using a structured questionnaire during face-to-face interviews. These face-to-face interviews were extremely helpful to explain the upcoming longitudinal, quantitative research design. Interview duration varied from 30 minutes to two hours. The interviews also allowed us to build trust and rapport with the founders to increase cooperation and response rate during the quantitative, longitudinal data collection process. Interviews with these companies revealed their business model and future plans which confirmed their innovative reputation. All these companies were granted by the IWT because they had developed technological innovations which could have a significant economic impact. Based on the pre-selection by the IWT, the face-to-face interviews and an extensive web search, we concluded that these companies were active in nascent markets. ICT companies in our sample focus for example on mobile internet or cloud software. Engineering companies are developing solutions for electronic vehicles or invented new ways to save and generate energy. Biotech companies in our sample develop new generation of drugs that has the potential to treat a broad range of severe diseases.

In the end, we followed 230 founders of 124 new ventures (response rate of 67%) through the first interview round (2009) and the two follow-up rounds (2010 and 2011). In these follow-up rounds, we collected information about the entrepreneurial team and the capabilities the companies had developed after start-up. Here, we used a web-based survey supported by telephone follow-ups to collect capability data. We added company data on each of the ventures, which we collected from IWT (the innovation granting institute which supported this research), BELFIRST, GRAYDON, VENTUREXPERT and the Belgian Official Journal. By doing so, we managed to collect data on environmental dynamism, firm survival, types of investors, amount of raised capital, revenues, employees, sector, etc. In sum, we use several information sources to collect data on the entrepreneurial teams and their companies.

4.3.2 Dependent variable

Our dependent variable is firm failure. Firms were coded 1 if they failed during the time period studied and 0 otherwise. Failures included completed bankruptcies, completed

liquidations, closures based on company request, and merger or acquisition of organizations at risk of bankruptcy (Hannan and Freeman, 1989). We first identified whether a start-up had failed using the Belgian Official Journal. Secondly, we also used financial reports from GRAYDON to identify those companies that are having difficulties to fulfill their financial obligations. The founders of these firms were contacted and coded "1" if the founder confirmed that the company was bankrupt, liquidated or closed. Finally, we also investigated the rather small amount of companies that were acquired (3%) or were involved in a merger (0.8%). Based on the same financial reports from GRAYDON and reports from VENTUREXPERT, we classified an acquisition as unfavorable using the following criteria: (i) for VC-funded start-ups, if the transaction value (the value of the acquisition deal) was less than the total capital raised; (ii) if a start-up was not VC funded and reported a loss in the year prior to the acquisition; (iii) if the start-up is not VC-funded and we lack profitability data, if none of the founders of the focal start-up joined the acquiring firm (Arora and Nandkumar, 2011).

4.3.3 Independent variables

Dynamic capabilities. The capabilities were measured using a scale we developed to capture the extent to which new ventures have the capability to change. The scale was developed based on the scale of Danneels (2008) and the theoretical definition of dynamic capabilities by Teece (2007). Namely, Teece (2007) defines dynamic capabilities as the capacity of a firm (1) to sense and shape opportunities and threats, and (2) to seize opportunities and reconfigure the existing firm's assets. We started by developing an initial pool of scale items based on the scale of Danneels (2008) and the theoretical work of Teece (2007). The initial pool of items was then pre-tested in an interview round with four new technology-based ventures. In each round, two to three interviewees from each venture were asked to complete the questionnaire. While completing the questionnaire, entrepreneurs verbalized any thoughts that came to their minds. The items were revised following each interview round. At the end of round four, feedback from the respondents indicated that the scale items were clear, meaningful, and relevant. All constructs were measured using seven-point scales. A complete listing of the dynamic capability scale used in the study is provided in appendix D. Reliability analysis indicated that the items for these

measures have a Cronbach alpha of 0.809. This conforms to the accepted level of at least 0.70 (Nunnally, 1978). We created the dynamic capabilities index as a linear sum of the dynamic capability items means. The main differences with scales of Danneels (2008) and Drnevich and Kriauciunas (2012) are that the scale is more applicable for new ventures and covers more the different components of a dynamic capability as defined by Teece (2007).

4.3.4 Moderating variables

Role formalization (RoleForm). Pugh et al. (1963) identified the formalization of organizational tasks and roles as a key attribute of modern organizational structure. Role formalization in entrepreneurial teams captures "what one is asked to do" and refers to the identification and designation of particular functional roles and their assignment to specific individuals (Dalton et al., 1980). The role formalization variable was adopted from Sine et al. (2006) and is the number of formalized functions in a new venture divided by the potential maximum number of functional roles. The potential functional areas were defined based on Sine et al. (2006) and the face-to-face interviews in the first interview round. These include chief executive officer, chief financial officer, chief engineering/operations officer, human resources, international sales, marketing, research and development, sales, legal/IP. Following Sine et al. (2006), we also orthogonalized the variable role formalization to avoid problems with multicollinearity.

External board (Board). Firms were coded "1" if they have installed an external board. Firms were coded "0" when they did not have an external board. The board can be seen as an external extension of the internal structure and is considered as an important governance mechanism for firm survival (Dalton et al, 1999; Dowell et al, 2011). We only take outside board members into account which means that boards with solely founders and/or members of the management team are not included here.

Redundancy. The variable which has been used frequently to measure redundancy at the work floor is human resource slack (Mishina et al., 2004; Voss et al, 2008). Human resource slack refers to specialized and skilled human resources that are rare and absorbed (Mishina et al., 2004). We measured human resource slack in line with previous recently published

works by dividing the number of employees by the total number founding team members (Voss et al., 2008).

4.3.5 Control variables

We controlled for company age because this variable could have an important impact on the survival of companies (Sapienza et al, 2006) and the development of dynamic capabilities (Zahra et al., 2006). Company age is measured in months and collected by using BELFIRST. We use the natural log transformation because the variable company age was skewed. Secondly, we controlled for the environment in which new ventures operate. We used industry-level objective information to derive an index of environmental dynamism. The approach used has been adopted in a number of studies (e.g., Dess and Beard, 1984; Simerly and Mingfang, 2000, Castrogiovanni, 2002) and is viewed as the appropriate level of analysis for studying phenomena related to the environment. The industry-level rate of unpredicted change was measured as the standard errors of two regression slopes following the work of Dess and Beard (1984) and Castrogiovanni (2002). In each case, the independent variable was time. The dependent variables were industry revenues and number of industry employees. Industry revenue has been used as a measure of uncertainty in prior studies (e.g., Keats and Hitt, 1988), and number of employees is a common measure of change in research involving new businesses.

Specifically we regressed industry revenues and industry employees over 5 years against time (2005-2010), and used the standard error of the regression coefficient related to a time dummy variable divided by the average value of industry's revenues and industry employees to produce a standardized index of environmental dynamism. The industry-level archival-based data captured common environmental characteristics faced by participants within a given industry (Boyd, Dess, and Rasheed, 1993). Data on industry revenues and industry employment totals were acquired from the OECD STAN database. Time was regressed against these variables for the most recent 8-year period. An index of the standard errors of the regression slopes divided by their respective means was used as the indicator of unpredicted change for each of the two variables. These figures were then standardized and summed to create an overall index of environmental dynamism. In addition to this objective measure of environmental dynamism, we also collected

perceptual measures of environmental uncertainty and munificence (Maestro, 2009). Maestro (2009) adapted a five-item scale of environmental uncertainty from Miller and Droge (1986) and Sutcliffe (1994). Items include 'Products or services quickly become obsolete in our industry' and 'Actions of competitors in our industry are quite easy to predict (reversed code).' The six-item scale of environmental munificence (Maestro, 2009) was based on Sutcliffe (1994) and Zahra (1993). Items include 'Resources needed for growth and expansion are in abundance and easily accessible in our industry (reverse code)' and 'Demand for products and services in our industry is growing and will continue to grow.'

Beside environmental dynamism and company age, we also controlled for other variables that might influence the impact of dynamic capabilities on new venture survival, such as industry sector. Here, we obtained five categories: ICT, business services, biotech & pharmaceuticals, engineering and manufacturing. As mentioned before, the new ventures in our sample are active in nascent markets which can be brought under this traditional sector classification. Finally, we also controlled for the size of the firm and the founding team. Firm size was the total number of organizational members, including executives and employees. We use the natural log transformation because the variable company size was skewed. Founding team size was the number of executives in a firm. To avoid problems with multicollinearity, founding team size was orthogonalized (Sine et al., 2006).

4.4 Findings

The means, standard deviations and correlations of the variables are presented in Table 6. We found that 32 new ventures (26%) failed to survive the early stages, which is in line with previous studies on new ventures in nascent markets. Roberts (1991) studied technology-based firms in the Boston (US) area and found that failures rates were between 15 and 30%. A Norwegian study showed that survival rate for new technology-based firms is around 75% (Aspelund, Berg-Utby, and Skjevdal, 2005). The companies in our sample are between 6 months and 6 years old and on average 3 years old. Our environmental dynamism measures exhibits similar results as in previous studies (Simerly and Mingfang, 2000).

TABLE 6: Means, standard deviations, reliabilities, and intercorrelations of study and control variables

	Mean	Std Dev	1	2	3	4	5	6	7	8	9
1. Failure	0.21	0.41	1.00								
3. Csize[b]	4.85	5.22	− 0.18*	1.00							
3. Age	34.85	16.12	0.09	0.19*	1.00						
4. Envir	0.01	0.00	− 0.17*	0.13	− 0.07	1.00					
5. TeamSize[a]	2.62	1.44	− 0.18*	0.28**	0.06	0.18*	1.00				
6. DC	5.29	0.69	− 0.11	− 0.14	− 0.15*	− 0.02	0.10	1.00			
7. RoleForm[a]	0.29	0.16	− 0.33**	0.42**	0.19*	0.14	0.45**	0.04	1.00		
8. Board	0.56	0.50	− 0.21**	0.25**	− 0.04	0.12	0.37**	0.12	0.44**	1.00	
9. Redundancy[b]	2.61	2.67	− 0.01	0.44**	0.19*	0.03	− 0.06	− 0.17*	0.08	− 0.03	1.00

* Significant at $p < 0.05$ (two-tailed), ** Significant at $p < 0.01$ (two-tailed), n= 170

[a]Orthogonalized variable

[b]Log-transformed variable

Table 7 summarizes the results of the regression analyses. Because the dependent variable displays the probability of a focal event (firm failure), we employ event history analysis to investigate the impact of dynamic capabilities on firm failure. Event history analysis allows for the modeling of event probability at each time point, and considers both the occurrence and timing of an event, that is, distinguishing between failure one year after company foundation and failure two years after foundation, which is not possible in a logistic regression (Cui et al., 2010). More specifically, we apply a Cox proportional hazard model. Cox models are more suitable than parametric models because it is difficult to make a realistic assumption of the baseline hazard function and incorrect parametric specification of the baseline hazard function would introduce bias into the analysis.

All models in Table 7 are highly significant. Column 1 presents the results of the baseline model with control variables alone (X^2= 1096.54, p< 0.001). We see that company age has a positive significant impact on new venture failure, while company size is negatively related to failure. Firms founded in biotech & pharmaceutical emerging markets or firm established around innovative business services are more likely to survive the early stages. Instead, firm active in emerging markets related to the engineering industry are more likely to cease their activities. Environmental dynamism has a negative impact on new venture survival. We also run the same model with perceived environmental uncertainty and found a similar

negative relationship with survival. Column 2 shows the results of the regression with the direct effects (X^2= 25.32, p< 0.001). After introducing the direct effects in Model 2, the explanatory power, measured by the generalized R square, increases significantly from 0.20 to 0.30. H1 which posits that the dynamic capabilities of a new venture will help new ventures to survive the early stages and thus negatively impacts failure is supported (p< 0.01). Further, we noticed that role formalization has a negative significant impact on new venture survival which is in line with the findings of Sine et al. (2006). The final model includes the interaction effects (X^2= 20.98, p< 0.001). The generalized R-square increases again significantly from 0.30 to 0.39. H2 which states that role formalization has a moderating effect on the relationship between dynamic capabilities and failure is supported at the 0.01 level. H3, which stated that the negative impact of dynamic capabilities on the probability of failure will increase with the availability of an external board, did not found support. Instead, we found that the impact of dynamic capabilities on failure will increase because of the availability of an external board (p<0.05). Finally, we found support for H4 which means that redundancy at the work floor will increase the negative impact of dynamic capabilities on failure. The simple slope analyses (illustrated in figure 11, 12 and 13) confirm our interpretations of the moderating effects in the regression analyses.

TABLE 7: Cox proportional hazard regression with failure as dependent variable

Variables	MODEL 1	MODEL 2	MODEL 3
Sector dummies			
ICT	-0.22 (0.42)	-0.11 (0.33)	-0.03 (0.31)
Business services	-0.14 (0.06)*	-0.62 (0.18)**	-0.29 (0.09)**
Biotech & Pharmaceuticals	-0.79 (0.14)**	-0.52 (0.11)**	-0.47 (0.15)**
Engineering	0.29 (0.10)**	0.56 (0.18)**	0.62 (0.18)**
Founding team size (TeamSize)	-0.28 (0.27)	0.31 (0.30)	0.46 (0.22)*
Company size (Csize)	-0.34 (0.14)*	-0.48 (0.24)*	-0.94 (0.32)**
Company age (Age)	0.01 (0.01)*	0.01 (0.01)†	0.01 (0.01)*
Environmental dynamism (Envir)	-0.15 (0.13)	-0.19 (0.13)	-0.18 (0.11)†
Role formalization (RoleForm)		-0.70 (0.31)*	-0.97 (0.26)**
External board (Board)		-0.13 (0.30)	0.17 (0.31)
Redundancy		0.20 (0.22)	0.53 (0.23)*
H1 Dynamic Capabilities (DC)		-0.56 (0.18)**	-0.85 (0.11)**
H2 Dynamic Capabilities X Role formalization			-0.85 (0.21)**
H3 Dynamic Capabilities X External board			0.79 (0.48)*
H4 Dynamic Capabilities X Redundancy			-0.44 (0.25)*
Log-likelihood	-148.95	-139.28	-135.72
Generalized R^2	0.20	0.30	0.39
n	170	170	170

Significance tests are one-tailed for hypothesized relations and two-tailed for controls.
†p<0.10, *p<0.05, **p<0.01

FIGURE 11: Graphical Presentation of Interaction between 'dynamic capabilities' and 'Role formalization' on new venture failure

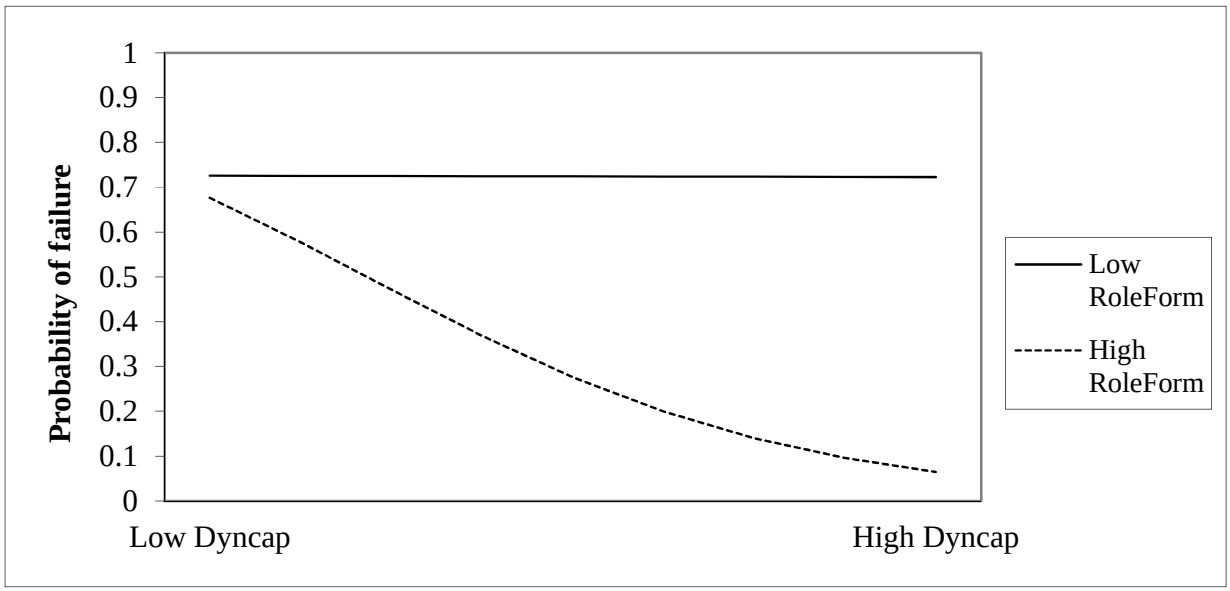


FIGURE 12: Graphical Presentation of Interaction between 'dynamic capabilities' and 'External Board' on new venture failure

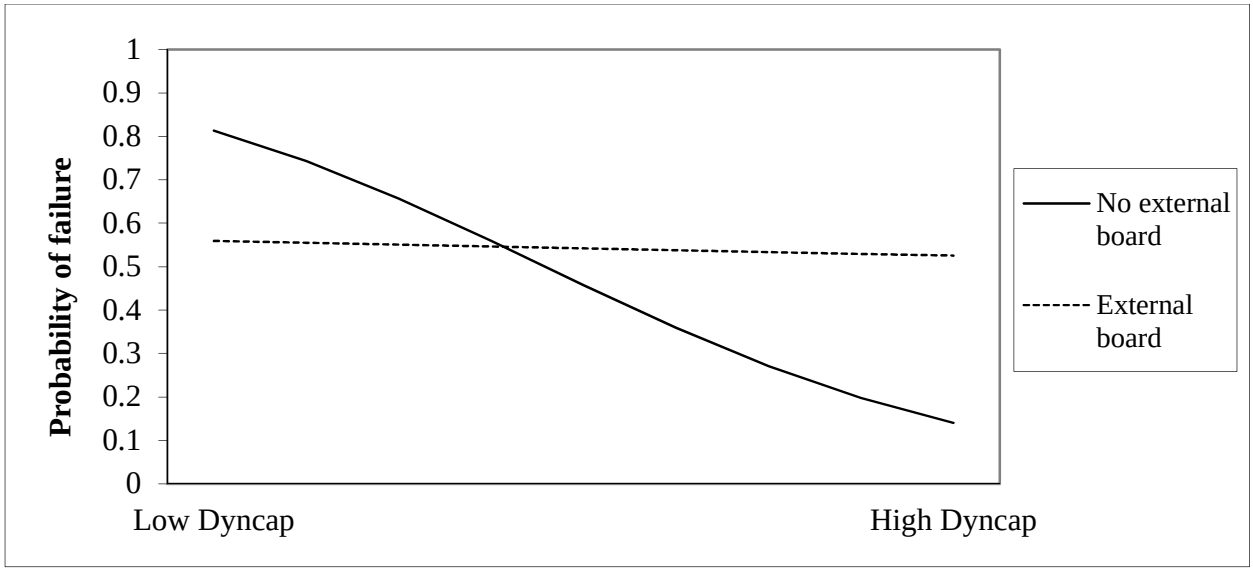
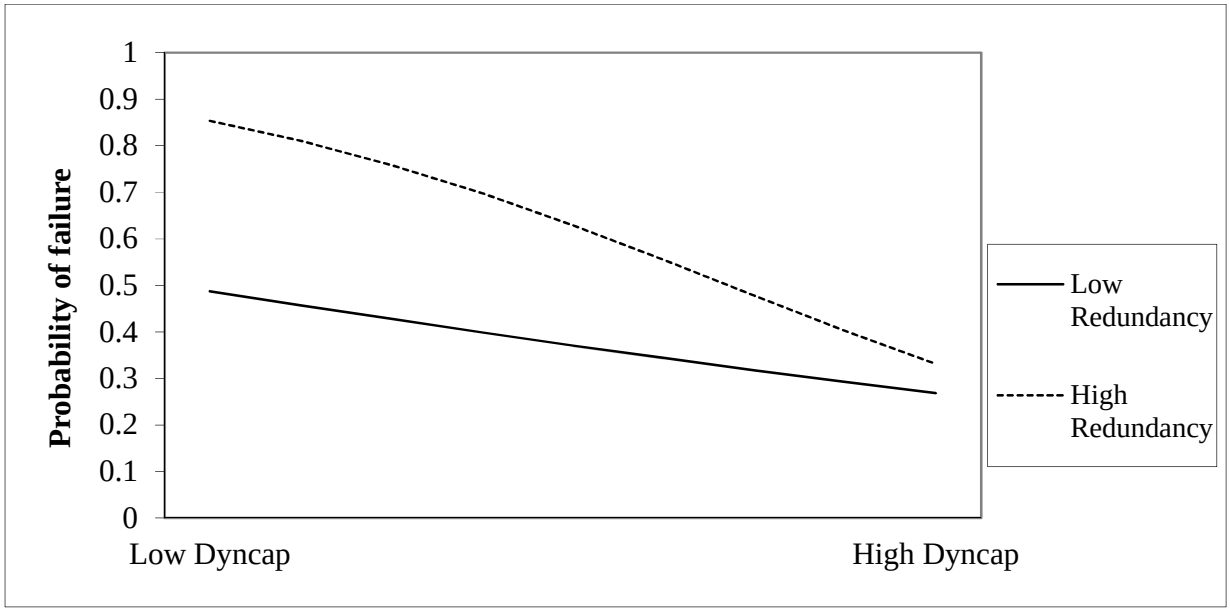


FIGURE 13: Graphical Presentation of Interaction between 'dynamic capabilities' and 'Redundancy' on new venture failure



4.5 Discussion and conclusions

Our objective in this study was to examine the relationship between the dynamic capabilities developed in a new venture, the processes which invoke its stability and its survival in nascent markets. Combining arguments based upon organizational theory and dynamic capabilities, we show that the internal structure of the venture in terms of the adopted role formalization in the founding team and the redundancy at the work floor operationalized as the employees per manager form strong boundary conditions for dynamic capabilities to enhance the survival potential of the venture. As expected, developing dynamic capabilities over time also increases the potential survival of these firms significantly. In contrast to our hypotheses, boards do not amplify the impact of dynamic capabilities on survival. On the contrary, they moderate this relation.

This study extends the literature on dynamic capabilities by showing how stability in its form of formal structures within the organization and redundancy or slack at the work floor form fertile grounds. In line with Farjoun's (2010) theoretical arguments on duality

between change and stability, we find that dynamic capabilities work best when they are embedded in a stable and well-structured organization. As such, they do not form a tradeoff but have, as hinted at by Zahra et al. (2006), complex interactions among each other. Dynamic capabilities without stable underlying structures might lead to chaos and at least moderate the positive impact of these capabilities in nascent markets. The counter-intuitive hypothesis that dynamic capabilities are strengthened by this form of stability is novel and extends the theoretical perspective on dynamic capabilities, which at most considers these capabilities to be contingent upon the environment and the development of underlying operational capabilities. The fact that organizational stability underpins the impact of dynamic capabilities has been largely neglected in the literature. Our study shows that companies in nascent markets, of which the environmental conditions force these companies to explore business models, need to create stability in order to be able to allow for changes. These findings are also in line with Sine et al.'s (2006) findings that formal structure enhances performance in new ventures (in nascent markets). However, we show that their findings do not exclude flexibility. Ventures which have a degree of formalization exceed in addressing changes in the environment by developing specific dynamic capabilities, which in turn amplify the impact on performance.

In addition to the theoretical contribution, this article also provides an empirical contribution to the literature on dynamic capabilities (Eisenhardt and Martin, 2000; Teece, 2007) by developing and testing measures of dynamic capabilities. Moreover, we show the often assumed but never tested positive impact of dynamic capabilities on the most important performance outcome of new ventures in nascent markets, namely firm survival. Despite the increased interest in dynamic capabilities, the concept remains an empirically unexplored construct with the exception of a few studies (eg. Danneels, 2008; Drnevich and Kriauciunas, 2012), most researchers measure the construct in an indirect way instead of developing a scale. The fact that we empirically show that dynamic capabilities contribute to the survival of ventures in nascent markets, reinforces the underlying assumption that developing the conditions in a ventures which allow for change, prevails.

Third, our paper also shows that boards have an impact which is contrary to the one we hypothesized. Despite the fact that the board literature shows that boards bring stability to

a venture due to their monitoring function, they do not amplify the impact of dynamic capabilities. This indicates that the role of boards might be more complicated than initially hypothesized in this paper. Despite the fact that boards facilitate structure and financial reporting procedures, they might also invoke rigidity in a company because of resource cognition (Danneels, 2010). Resource cognition refers to the cognitions which managers have about the firm's resources. More specifically, resources cognition refers to the identification of resources and the understanding of their fungibility, which is crucial in understanding the impact of dynamic capabilities. Danneels (2010) shows that the further away executive decision makers are from the work floor the more difficult it will be for them to assess the real resources of the company. Hence, directors in a venture might rely on cognitions which are detached from the real environment in which the venture operates or which are different from the real resource base that can form a competitive environment. We can imagine that directors, who are only occasionally present at the venture and who serve on different venture boards, do not have the same focus of attention as founding team members. Still, due to the power of boards in ventures, they will codetermine strategic decisions and monitor the actions taken by the venture executives. Their deep involvement in the strategic decision making might be counterproductive, especially in nascent markets where usually no financial performance indicators are possible to use as benchmarks. This finding is particularly important to increase our understanding of the role which boards play in new ventures and extends the relatively new, emerging theories on board monitoring in new ventures (Garg, 2012).

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APPENDIX D: Dynamic capabilities scale

Different companies are good at different things. The following questions ask you to assess your company's skills in various areas, relative to other start-ups. Relative to other start-ups and based on new information, my company is good at …

	Strongly Disagree						Strongly Agree
1. Assessing the potential of new markets	1	2	3	4	5	6	7
2. Researching new competitors and new customers	1	2	3	4	5	6	7
3. Assessing the feasibility of new technologies	1	2	3	4	5	6	7
4. Identifying promising new technologies	1	2	3	4	5	6	7
5. Changing the marketing and communication plan	1	2	3	4	5	6	7
6. Altering the product roadmap	1	2	3	4	5	6	7
7. Making changes to the global delivery model / distribution channels	1	2	3	4	5	6	7
8. Revising the technology roadmap	1	2	3	4	5	6	7

5 Conclusions, implications and directions for further research

This dissertation is a collection of three empirical papers on the capabilities of new technology-based firms. The first study examines the process by which firms develop dynamic capabilities to restructure their resources configuration and bundle resources into new substantive capabilities. In this study, I draw on the attention-based view, the cognitive dissonance theory and the literature on competing objectives to reveal possible barriers to the development of dynamic capabilities. The second paper focuses on the impact of early top managers (founders) and entrepreneurial teams on the development of capabilities. More specifically, I use the upper echelon theory and the micro-foundation perspective to investigate which managerial characteristics impact either the development of substantive or dynamic capabilities. In the third paper, I study the relationship between dynamic capabilities and firm survival. Here, I reveal the conditions under which dynamic capabilities can be beneficial for surviving the early stages.

In this final chapter I summarize the main findings of these three studies. Next, I discuss the most important contributions for management science and provide an overview of the implications for management practice. Last, I give an overview of the limitations of my Ph.D which give rise to potential avenues for future research.

5.1 Main findings

The dynamic capabilities view has become dominant in explaining how firms can create a competitive advantage. Dynamic capabilities can be defined as the capacity of a firm to change their resource base, its substantive capabilities or its environment. Substantive capabilities are the firm's capacity to perform a particular activity in a reliable and at least minimally satisfactory way (Helfat and Winter, 2011). While recent research provides empirical evidence that dynamic capabilities are crucial for the performance of both established (Drnevich and Kriauciunas, 2012) and new companies (see third study of this Ph.D), the existing capability literature remains largely silent when it comes to explaining how these capabilities emerge (Autio et al, 2011). To trace the emergence of capability formation, one needs to track the early stages of a firm, because it is during this phase that capabilities are developed. As Autio et al. (2011) highlighted, in a firm's early stages no

routines have been accumulated over time, and more focus is needed on de novo capability development. In order to analyze which capabilities managers are likely to develop from scratch in firms, Teece (2007) already highlighted that the micro-foundation view on capabilities is an interesting avenue for research because most research on capability development is on a firm level.

In paper 1, I performed a case study of a new technology based firm and focused on the micro-foundations of capability development. The capability literature in general has been criticized as lacking fundamental theoretic logics which explain the origins of capabilities and the micro-processes behind the development of capabilities. In line with this a few studies have argued that hierarchies matter in explaining dynamic capabilities. Building on the attention-based view, the cognitive dissonance theory and the literature on competing objectives, I analyzed how a dynamic capability is developed over time in a new venture which was initially one of the highest successes but eventually failed to address a significant change in the environment. Using the phases of *perception, willingness* and *ability* which typically are considered the building blocks of dynamic capabilities, we found several **important barriers to the development of dynamic capabilities.** First, we show that a firm should be able to **manage attention** which is distributed **across different levels of the hierarchy as part of the awareness creation process.** Understanding the management of distributed attention is key to advancing the theory of dynamic capabilities and more specifically to improve the "awareness/perception" part. Attention is distributed at different levels in the organization (Ocasio, 1997) and both the level and focus of attention differs at these various decision making levels. Hence, the level at which the environmental change is detected and where most likely the answer to that change will be formulated will have to communicate clearly to the other levels in the organization in order to facilitate that distribution of attention. We refer to the theory of issue selling to address these challenges.

Secondly, firms should **manage different levels of cognitive dissonance to create willingness**. Although different layers in the organization were recognizing the change in the environment and were willing to develop an answer to address the environmental need, this did not mean that they were willing to change the business model at company level nor

to change the associated resources. In fact, we showed that those individual decision makers who had extensive experience in their job and who had thus developed heuristics which could help them to interpret the environment, were the least willing to change anything. Instead, they used their cognitive maps to fine-tune the current business model with which they felt comfortable. We theoretically explained this process by referring to the theory of cognitive dissonance. It explains why people resist against change and how they resist against change. Since dynamic capabilities have as an objective to introduce change in an organization, developing these capabilities means that cognitive dissonance will have to be managed. We argue that mechanisms of collective sense making are needed to overcome these individual dissonances.

Finally, realizing change implies that not only perception and willingness are created, but also that the individual decision makers must be able to implement the change deemed appropriate. We show that instead of moving from one configuration to another, the new business model and resource configuration are developed in parallel to the existing one, due to cognitive dissonance. Individuals will try to marginalize the dissonant cognition and leave the development of the new business model to individuals with less dissonant cognitions. However, this form of experimentation with a new business model implies that a significant number of the employees had to **be able to pursue competing objectives** due to limited resources. The degree to which they were able to do so also determined the ability with which the company was able to go through the final stage of the dynamic capability process, namely its implementation.

Building on the upper echelons theory, which state that the firm reflects the preferences of its top management team (Hambrick and Mason, 1984), I found in the second study of my Ph.D that micro-foundations, measured as personality traits, also explain why ventures either develop substantive or dynamic capabilities. We show that **substantive and dynamic capabilities are different constructs**, that find their roots in very different individual-level personalities. First, I show that **conscientious founders and their teams foster the development of substantive capabilities.** Conscientious founders are typically described as hard working, achievement oriented, forward planning and well structured (Gellatly, 1996; Ciaverella et al., 2004; Bell, 2007). This personality type impacts the way in

which the venture is structured and predicts the extent to which the founder emphasizes the development of procedures to increase the venture's efficiency. However, to sense or shape new opportunities and to change existing substantive capabilities, new ventures need to develop dynamic capabilities. Our findings indicate that conscientious founders lack interest in developing these capabilities. Instead, I found that conscientious individuals need proactive team members to develop dynamic capabilities. Hence, if conscientious founders team up with proactive co-founders, their ventures do develop dynamic capabilities. Our results also show that **proactive personalities have a strong positive impact on the development of dynamic capabilities**, while they ignore the development of substantive capabilities. We further find that firms with proactive entrepreneurs without conscientious co-founders tend not to develop substantive capabilities. This means that proactive individuals will also benefit from working with conscientious co-founders. Because personality types and the behaviors which result from them are found to impact the development of capabilities in different ways, we provide a strong theoretical explanation for the micro foundations of capability development.

In the third paper, **we clarify the conditions under which dynamic capabilities play an important role in the early stages of a new venture.** First, this article shows the often assumed but never tested positive impact of dynamic capabilities on the most important performance outcome of new ventures in nascent markets, namely firm survival. Secondly, this study extends the literature on dynamic capabilities by showing how **stability** in its form of **formal structures** within the organization and **redundancy** or human resource slack at the work floor do form fertile grounds. In line with Farjoun's (2010) theoretical arguments on duality between change and stability and by combining arguments based upon organizational theory and dynamic capabilities, we find that dynamic capabilities work best when they are embedded in a stable and well-structured organization. Dynamic capabilities without stable underlying structures might lead to chaos and at least moderate the positive impact of these capabilities in nascent markets. Despite the fact that the board literature shows that boards also bring stability to a venture due to their monitoring function, we find that **external boards**, in comparison to role formalization of the founding team and redundancy on the work floor, do not amplify the impact of dynamic capabilities.

5.2 Implications

5.2.1 Implications for management science

This research makes several contributions to management science. First, this study **investigate dynamic capabilities in the context of new ventures**. So far, the dynamic capabilities literature has given scant attention to younger firms as reviews of the capability literature show that most research and theory building has focused on established companies (Zahra et al., 2006). Moreover, a growing body of scholars have called for more empirical research on how extant organizational theory applies to new ventures (Shane, 2003; Sine et al., 2006). New ventures start with a business plan to create an outcome. However, environmental conditions, resource constraints and cognitive limitations almost always prevent founders from executing their plans as initially intended (Baker, Miner, & Eesley, 2003; Hmieleski & Corbett, 2008). This means that new ventures also need dynamic capabilities that will help them to sense and seize opportunities so that the firm can change their existing resources configurations into new and more profitable directions (Teece, 2007). This study defines dynamic capabilities in a new venture context, provides insights in how dynamic capabilities are formed and explains under which conditions dynamic capabilities can be beneficial for new venture survival. Consequently, this dissertation contributes to the fields of both strategic management and entrepreneurship.

Second, this dissertation **disentangles substantive from dynamic capabilities**. From a theoretical perspective, we contribute by identifying resource bundles within a venture that could be associated with either increasing the efficiency of operations, i.e. substantive capabilities, or changing resource configuration, substantive capabilities or its environment, i.e. dynamic capabilities. Therefore, we used an in-depth case study using participant observation. From an empirical point of view, we developed the **first measurement instrument to differentiate substantive and dynamic capabilities** based on our participant observation and several rounds of scale refinement. Other available instruments (such as Danneels, 2008) only measure dynamic capabilities.

Third, we contribute to the literature stream on the origins of organizational capabilities by taking a **micro-foundations perspective**. Felin and Foss (2011) call for a micro-foundation

perspective on capability formation, i.e. a focus at the individual level to understand the origins of capability formation (Felin and Foss, 2005). This call is further endorsed by several researchers including Eisenhardt and Martin (2000) and Helfat and Peteraf (2003) who argue that individual-level attributes are important in the early stages of capability development. More specifically, building upon the personality literature, we show that conscientious founders and their teams foster the development of substantive capabilities, while proactive founders speed up the development of dynamic capabilities. Because personality types and the behaviors which result from them are found to impact the development of capabilities in different ways, we provide a strong theoretical explanation for the foundations of capability development.

Fourth, our study extends existing research **on effects of upper-echelons team composition on team outcomes.** Some studies on team composition focus mostly on diversity effects (e.g., Foo, Wong, and Ong, 2006) while other researchers include average team characteristics (e.g., Kearney, Gebert, and Voelpel, 2004). Our study shows that a configurational approach can also predict firm outcomes when team members' characteristics complement each other. Relatedly, this study reinforces the key role of top managers in determining firm-level outcomes, including those of strategy, decisions, structure, and profits (c.f. Castanias and Helfat, 2001).

Fifth, this dissertation provides a process view on the development of dynamic capabilities which allow firms to move from one resource configuration to another. Recently, Danneels (2010) calls for a **process view** to open the black box of dynamic capability theory which allows to examine the paths and sequences of dynamic capability development (Barney et al., 2011). We extend the dynamic capability perspective by **describing the micro-processes** and micro foundations behind it and embedding them in the attention-based view, the theory on cognitive dissonance and literature on competing objectives.

Finally, we contribute to the literature stream that investigates the relationship between **capabilities and firm performance**. While the capability literature has a long tradition in explaining the impact of capabilities on firm performance, only very recently studies have provided empirical evidence (Drnevich and Kriauciunas, 2012). However, these researchers

provided evidence for established firms and use subjective measures to operationalize firm performance. In this dissertation, we clarify the conditions under which dynamic capabilities can be beneficial for the most important performance outcome of new ventures in nascent markets, namely firm survival.

5.2.2 Implications for practice

The findings and insights from this doctoral study are useful and relevant for entrepreneurs, managers, and investors and reveal some interesting implications for public investors and policy makers.

First, this thesis shows that **dynamic capabilities are important for new venture survival**. Environmental conditions, resource constraints and cognitive limitations almost always prevent founders from executing their plans as initially intended (Baker, Miner, & Eesley, 2003; Hmieleski & Corbett, 2008). New technology-based ventures that developed dynamic capabilities, have the capacity to change their existing resource configurations. Founders, entrepreneurs and managers should be aware of building such mechanisms from the very beginning.

Second, we **clarified the conditions under which dynamic capabilities can be even more important for new ventures**. In this dissertation, we tested the impact of three important factors of stability on the relationship between dynamic capabilities and new venture survival. First, we show that new ventures, especially in nascent markets, need some form of structure in which dynamic capabilities should be embedded. Dynamic capabilities assume that opportunities are identified and decisions are made about how to address new, emerging opportunities. If the roles in the founding team are clearly allocated, it is likely that these decisions will be taken easier since every member has a specific domain (e.g. technology, marketing, operations,…) for which he/she is responsible and trustworthy. A second important finding is that boards do not contribute to the positive impact of dynamic capabilities on firm survival. Founders, entrepreneurs and managers should be aware of the fact that the deep involvement of boards in strategic decision making can also be counterproductive, especially in nascent markets where usually no financial performance indicators are possible to use as benchmarks.

Third, this dissertation also has important implications for the **composition of an entrepreneurial team**. Firms reflect the preferences and decisions of the top team, especially in new ventures where there are few hierarchical layers. The literature has concluded that both substantive and dynamic capabilities are needed for firm success. Both types are influenced by learning and by the amount of previous experience. We show in this study that substantive capabilities and dynamic capabilities are different constructs that find their roots in very different individual-level personalities. In other words, the personalities in a team will determine which form of capabilities is emphasized. As business plans and experiences of the entrepreneurial team are seen as important criteria for entrepreneurial success, we show in this study that the personalities in a team, measured as the level of conscientiousness and proactiveness, influences and determine the development of either substantive or dynamic capabilities which are needed to ensure the firm performance. Consequently, investors should not ignore the dominant personalities in an entrepreneurial team when they make their investment decisions.

Fourth, our case study shows an example of a new venture which was initially one of the highest successes but eventually failed to address a significant change in the environment. This study analyses how dynamic capabilities come into existence, reports **important barriers to the development of dynamic capabilities and offers solutions to deal with these barriers**. We used the phases of perception, willingness and ability as the building blocks of dynamic capabilities. The findings in this study could help entrepreneurs to manage these three important building blocks. We show that a firm should be able to manage attention, which is distributed across different levels of the hierarchy as part of the awareness creation process, by the process of issue selling. The “objectivisation” of data through the use of testimonials and external exports, the “change in modes of communication” by increasing direct involvement of the actors in different committees and the “communication persistency” by continuously putting important issues on the agenda, are concrete solutions proposed in our study.

New ventures should also be able to manage different levels of cognitive dissonance to create willingness to change. Managing cognitive dissonance implies that mechanisms of collective sense making are needed to overcome individual dissonances. Material artifacts are one such form of mechanism. Previous research has shown that the use of prototypes and other visual artifacts facilitates both sense giving from one individual to another and a generic collective form of sense making along which a group of individuals draws the same conclusions based upon a more collective form of discussion. In addition to material artifacts, the development of generic KPIs (key performance indicators) for the new business model can be seen as an additional way to stimulate collective sense making at the higher levels of the organization. Finally, the use of a benchmark company which had already developed a similar business idea did increase the willingness to further explore this avenue among the key decision makers.

A third important building block that entrepreneurs, managers and other stakeholder of a new venture should take into account when change is needed, is the ability to implement changes. We argue that the management of competing objectives is an important element of this implementation process. Our paper proposes both contextual, system level and managerial practices to induce the simultaneous pursuit of such competing objectives. The company should attract individuals who are able to cope with individual ambidexterity and create a context to promote this form of individual level ambidexterity. However, this is not sufficient. The organizational system should also have built mechanisms to deal with stability and change. This can be realized by bringing redundancy and cognitive variety into the system. In addition, managerial practices such as flexibility inducing mechanisms and the use of simplifying heuristics can further increase the effectivity of managing efficiency and flexibility as a duality.

Besides implications for founders, entrepreneurs, managers, board members and investors, this study also has a few important implications for public investors and policy makers. The study provides useful insights for policy makers who want to develop a **policy towards new technology-based ventures**. The economic crisis decreased activity dramatically in particular industries. The loss of economic activity will partially have to be compensated by the development of new industries, of which new technology-based ventures are important

drivers. Policy makers are aware of the importance of these types of companies and set up various financial and non-financial support mechanisms. However, the failures rates of these companies are still quite high. This study shows that new ventures are often not able to execute their business plans as initially agreed with investors. Public investors should be aware that **new technology-based firms need to have the space to change their resource configurations** in the direction of potentially more profitable opportunities. This means, for example, that public investors may not force new ventures, active in the early stages, to comply with initially agreed milestones. Instead, they should consider to refund them when they can present a new promising business model. Therefore, these public investors need to have experience in the field and perceive the necessary change.

Finally, the findings in this study can also provide more **input for entrepreneurship courses and training seminars offered by universities, government agencies or business schools.** The lessons learned from the new venture failure in the qualitative case study and the quantitative survival analyses of 124 new technology based firms should provide more insights on how to survive the early stages and drive to new venture success. Business schools and universities can use these findings and teach nascent entrepreneurs to be more aware of the pit falls and best practices for entrepreneurial success, mentioned in this Ph.D.

5.3 Limitations and directions for further research

As every empirical study, this thesis is not without limitations, thereby providing avenues for future research. First, the **dataset is comprised of young, technology-based firms located in Flanders**. Although this has the benefit of reducing non-measured variance, it raises the question whether the results would hold in different environmental settings and for other types of firms. Future research may perform similar studies in different countries and industries (e.g. low versus high tech) to contribute to our understanding of the generalizability of these findings.

Second, in this dissertation, we focused on the personalities that influence either the development of substantive or dynamic capabilities. While this study already reveals that conscientiousness and proactiveness are two personality types which are useful in the

beginning of a company's life, future studies could analyze how additions or **changes in the entrepreneurial team can speed up or slow down the development of certain capabilities.** Future work could also explain why experience in setting up a structure and developing substantive capabilities can be transferred more easily to another start-up company as opposed to the experience in sensing or shaping new opportunities.

Third, in this thesis we did not include **team processes** as potential independent variables for the development of either substantive or dynamic capabilities. Here, we looked at the personalities, experiences and cognition of individual entrepreneurs and entrepreneurial teams but we pay only limited attention to the interactions between personalities and people with different experiences. Future research could for example examine whether team conflict will have an influence on the development of dynamic capabilities (Jehn et al., 1999). Management teams with high levels of task conflict will probably be more able to revise the badly performing substantive capabilities and generate more alternatives and opportunities. Management teams which are more behaviorally integrated (Simsek et al, 2005), could be better in exploiting and structuring the existing ideas which helps firms to form strong substantive capabilities. Although we already considered the role of the board in our case study analyses, researchers could further investigate the specific impact of a board on the development of capabilities.

Fourth, we reported the **boundary conditions under which dynamic capabilities can have an important impact** on firm survival by adjusting and changing substantive capabilities. However, future research could further unravel and describe the relationship between role formalization, external boards, human resource slack and dynamic capabilities. For instance, our study only includes the presence of an external board, while future research could also look at the characteristics and the composition of board members. More specifically, future research could investigate which characteristics of board members or which board compositions will have a positive influence on the survival chances of new ventures in nascent markets. Additionally, researchers could come up with more boundary conditions under which dynamic capabilities can be beneficial for new venture success in the early stages of a company's life.

Fifth, future research could also look at the role of dynamic capabilities in the **growth stage of the firm.** Companies have much more stakeholders, different markets and products/services and will be bigger and even more resistant to change. What are barriers to develop dynamic capabilities in the growth stage (Cf. study 1)? What is the impact of top management teams on capability development in this stage (Cf. study 2)? What are the boundary conditions under which dynamic capabilities can be beneficial for firm performance in this stage of the company development (Cf. study 3)?

Finally, we contribute to the micro-foundations literature stream and to the resource management framework of Sirmon et al. (2007). They argue that **managers play an important role in** structuring the resource portfolio, bundling the resources into capabilities and **leveraging capabilities to exploit market opportunities.** Study 1 shows the role of managers in the process of structuring and bundling resources. Moreover, we investigate how managers can restructure these processes when an environmental shock influences the company's business activities. In study 2, we found out which managerial characteristics will influence the process of bundling resources into either substantive or dynamic capabilities. In the third study, we looked at the relationship between dynamic capabilities and new venture survival. We contribute to the literature on resource management by showing that role formalization in management teams reinforces the firm's ability to leverage capabilities in the market. However, we did not investigate the impact of managerial or founder characteristics on the firm's ability to leverage capabilities in order to exploit opportunities in the market. This remains an important future research avenue (Sirmon et al. 2007, 2011).

5.4 References

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